JPRS 76743

3 November 1980

USSR Report

ENERGY

No. 36

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service (NTIS), Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semimonthly by the NTIS, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Indexes to this report (by keyword, author, personal names, title and series) are available through Bell & Howell, Old Mansfield Road, Wooster, Ohio, 44691.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS 76743

3 November 1980

USSR REPORT

ENERGY

No. 36

CONTENTS

UDC 621.311.002.1"324"

POWER INDUSTRY PREPARES FOR WINTER

Moscow ELEKTRICHESKIYE STANTSII in Russian No 9, Sep 80 pp 2-4

[Article by Ye. I. Borisov, the First Deputy Minister of Power and Electrification of the USSR: "The Tasks of the Power Enterprises in Preparing for Uninterrupted Work in the Fall-Winter Period of 1980-81"]

[Text] The question "Preparing the power enterprises for uninterrupted work in the coming fall-winter period of 1980-81" was discussed at a meeting of the expanded USSR Minenergo [Ministry of Power] collegium on 30 June 1980 which was attended by the administrators of the republic ministries, chief administrations, power systems and associations, construction and installation trusts, the major electric power stations and construction projects, representatives of ministries and departments, suppliers of fuel, equipment and spare parts.

The provision of an uninterrupted power supply to the national economy and the population will largely depend on how carefully all of the power equipment of the electric power stations, electrical and thermal nets, the fuel transportation and auxiliary facilities of the electric power stations will be prepared for winter, how the work of creating fuel reserves has progressed, if new power capacities have been put into operation in a timely fashion, and how much more widely and concretely work will be conducted on conserving power resources in the energy systems and by electric and thermal power consumers.

As is generally known, the plenum of the CPSU Central Committee at which the decree on convoking the 26th CPSU Congress was adopted took place on 23 June 1980.

In his report at the plenum, the general secretary of the CPSU Central Committee, the chairman of the Presidium of the Supreme Soviet of the USSR Comrade Leonid Il'ich Brezhnev said:

"We must apply--and it pays to stress this--the maximum amount of energy in order to successfully fulfill and overfulfill the plan of the concluding year of the tenth five-year plan, to put into operation in a timely fashionprojects under construction, and to provide for the steady operation of the national economy in 1981--the first year of the 11th five-year plan. Here, of course, socialist competition in honor of the congress must play its role."

The plenum paid special attention to the further tasks of solving energy fuel and transportation problems.

All of this seriously increases the responsibility of all sectors of power engineering to organize a dependable power supply and to review operations in 1980.

On 2-3 June 1980 a conference took place at the CPSU Central Committee of power construction people, workers of power and power machine building enterprises and institutes on the problems in developing power engineering.

In an address to this conference, member of the Politbureau of the CPSU Central Committee, secretary of the CPSU Central Committee A.P. Kirilenko emphasized that the present year was a special one. It concludes the 10th Five-Year Plan, and is a year of preparation for the 26th CPSU Congress.

In the final year of the five-year plan we have to introduce significantly greater power capacities than in the past year. An especially large volume of work has been envisioned for the construction of atomic and hydraulic electric power stations.

One of the major tasks is to strengthen work on the construction of AES's, to create the Ekibastuzskiy and Kansko-Achinskiy power fuel complexes which have enormous importance for the electrical supply of Siberia, Kazakhstan, the Urals, and the Center of the country.

The preparation for the next party congress will be a new powerful lever for a further advance of political and laboring activity of the Soviet nation and will stir up a new wave of socialist competition for the fulfillment of the 1980 tasks. The power engineers, like all of the Soviet people, will meet the outstanding event in the life of our party and nation--the 26th CPSU Congress--with meritorious laboring deeds.

The preparation of the power facilities for the coming winter in this light acquires special significance, for the responsibility for an uninterrupted power supply is growing significantly, and a high degree of organization, responsibility, and the strictest discipline are required in all parts of power engineering.

First of all it is necessary to complete capital and medium repair work of the equipment of electric power stations and network projects by 15 October. It is necessary to increase power capacity potential by a fuller utilization of equipment and by increasing the carrying capacity of the VL[overhead lines], to provide by 1 December the required introduction of power capacities and their steady operation at a volume of not less than nine million kilowatts.

The power systems and power markets, the main administrations, ODU[integrated dispatching control], and Gosenergonadzor[State Inspection for Industrial Power Engineering and for Power Engineering Supervision] must work to efficiently lower the voltage during the maximum load hours and,

jointly with each enterprise, determine concrete measures for the more efficient expenditure of power resources. This must be one of the important questions in the preparatory work for winter.

The coming fall-winter maximum load season requires of all sections a great responsibility for maintaining the work involved in the winter preparations.

The power workers are obligated to perform the capital repair of equipment in the power systems of the Center, Middle Volga, Urals, Ukraine, North Caucasus, Kazakhstan, and Siberia by 15 October.

The cold weather in March-April delayed the progress of capital repairs and a number of the power systems of Glavtsentrenergo/Main Administration of Electric Power Plants and Networks of the Central Region/, Glavuralenergo/Main Administration of Electric Power Plants and Electric Power Networks of the Urals/, Glavyuzhenergo/Main Administration of Southern Power Systems/, and Minenergo of the Ukraine and Kazakhstan have fallen behind considerably in fulfilling the established tasks.

The individual electric power stations are tolerating overly long periods of idleness for equipment in repairs. The Cherepovetskaya GRES has exceeded the repair time period for block number two by 30 days, the Karmanovskaya GRES for block number four by 16 days, the Burshtynskaya GRES for block number four by 9 days. Often the time periods for the downtime of power blocks in medium repair are substantially exceeding the norms.

The operating main administrations and Glavenergoremont/Main Administration for the Repair of Electric Power Plant Equipment/ have been obliged to react in a timely fashion to such violations, and to take measures to eliminate their causes.

Repair work must be organized on two and three-shift schedules, and we must use lump and piece-rate wages in order to raise repair work effectiveness.

The main administrations, Glavenergoremont, and Gosinspektsiya/State Inspection Committee/ for operations must strictly control the repair of hot-water boilers and main hot-water pipes, keeping in mind the number of complications in the heat supply of cities which took place in past years.

Questions concerning the material and technical security of repairs are being resolved better this year. Additional rolled metal, pipes, electrodes, and other materials have been allotted to the ministry.

At the same time there is a need to increase attention to providing repair work with lead battery plates, ion-exchange resins for chemical water purifiers, molybdenum-containing steel for the manufacture of turbine brackets, power lumber and wire for the repair of electric

transmission lines, pumping equipment, and large-diameter bearings. The job of Glavsnab/Main Supply Administration/, Glavenergoremont, and Glavenergokomplekt/Main Administration for Ensuring the Supply of Complete Sets of Power Engineering Equipment of Electric Power Plants, Substations and Networks/ of the ministry is to adopt timely measures.

A number of plants of Minenergomash/Ministry of Power Machine Building/, Minelektrotekhprom/Ministry of the Electrical Equipment Industry/, Minkhimmash/Ministry of Chemical and Petroleum Machine Building/, and Minsudprom/Ministry of the Shipbuilding Industry/ are still not fulfilling the tasks for spare parts shipments. The delivery of rotating vanes for the 300-megawatt turbines continues to be unsatisfactory and this is seriously complicating repairs at a number of electric power stations.

Plant managers must understand that the delivery shortfall of spare parts can seriously complicate the work of a number of electric power stations, and consequently, the power supply of the national economy.

In 1980 the ministry established the task of eliminating the interruptions to power capacities and the limitations on the power output because of the VL.

Glavvostokelektroset'stroy/Main Administration for Construction and Installation of High-Voltage Electric Power Networks and Substations in the Urals and Siberia/, Zapsibenergo/West Siberian Power Supply Administration/, Turkmenglavenergo/Turkmen Main Power Supply Administration/, and Glavseverovostokenergo/Main Administration of Electric Power Plants and Networks of the Northeast/ must eliminate the restriction on the power output of the Surgutskaya and Maryyskaya GRES's and the Zeyskaya GES.

In spite of the fact that the projects are just about fully supplied with building materials and structures and equipment, work fulfillment is lagging significantly at the Kurganskaya, Lipetskaya, Ufimskaya, and Novo-Kemerovskaya TETs.

The construction of cooling towers at the Orlovskaya, Novosibirskaya, and Izhevskaya TETs is being conducted poorly and this leads to an underexploitation of capacities and an overexpenditure of fuel because of the operation of less economical units. More effective measures are required from the appropriate subunits.

The timely establishment of the necessary fuel reserves at the electric power stations by winter and the proper preparation of the fuel transportation shops for winter operations are questions of paramount importance on which depends the steady work of all electric power stations.

Arrangements have been made to set up fuel reserves at electric power stations on 1 October 1980 which will be somewhat higher than last year's actual reserves. To ensure this, tasks have been established for all of the main administrations, republic ministries, energy systems, and large electric power stations in accordance with the amount of necessary fuel reserves by winter.

The managers of fuel transportation administrations, the chief directorates, and energy systems must take fuel realization under personal control and adopt measures to ban the overidleness of empty railroad cars.

A daily control must be established over the shipping of coal, fuel oil, and the delivery of gas for each electric power station. It is necessary to strengthen the measures for the fulfillment of tasks on the specific fuel expenditures, on decreasing the expenditure of electric power in power transportation, in industry, and in public utilities and agriculture.

The chief managers of the power systems, electric power stations, chief administrations, and republic ministries must have these questions at the center of their attention and they must feel a personal responsibility for securing them.

All of the electric power stations must provide, in proper amounts, for the repair of railway tracks, rolling stock, fuel depot and fuel supply mechanisms, and defrosters in order to prepare them for dependable winter operation.

Up to now the work has not been completed and they have not put into operation the crane reloaders at the Novocherkasskaya, Kurakhovskaya, Ryazanskaya, Chitinskaya, and Yermakovskaya GRES's; they have not assembled the car dumpers at the Troitskaya GRES, Ivanovskaya TETs-3, and the Novokemerovskaya TETs, and have not completed the construction of the fuel depot at the Kurganskaya TETs, and the defroster at the Kemerovskaya GRES. Completely unsatisfactory work is being carried out on eliminating the fuel supply and reloader crane flaws at the Omskaya TETs-4.

Soyuzatomenergostroy [Administration for the Construction and Installation of Nuclear Electric Power Plants] and Dneprostroy [State Dnepr Construction Project] are not taking proper measures to complete the construction of the facility for the factory repair of diesel locomotives and railroad cars at the Zaporozhskiy Repair and Adjustment Enterprise.

The struggle for fuel savings is a major part of the work.

Tasks have been specified for additional savings of fuel, electric power, and petroleum products at the enterprises, in the organizations and institutions.

For a six-month period the specific expenditure of fuel at electric power stations was 2.6 years(kilowatts x hours) lower, with a yearly task of 3.6 years(kilowatts x hours), than the very same period last year. To carry out a major task of the tenth five-year plan on lowering the specific expenditure of fuel in 1980 by up to 327 years(kilowatts x hours), it is necessary to take additional measures in the time remaining.

Undoubtedly the violation of the system of loading the most economical equipment and the lowering of the quality of the fuel supplied have affected the specific expenditure indicators for a number of electric power stations.

At the same time far from all of the power systems, electric power stations, and main administrations are taking the necessary measures to mobilize reserves for improving the operation of the machine units, and for decreasing individual losses. The tolerated overidleness in the repair of highly-economical power blocks leads to an increased utilization of less economical equipment.

Many power stations of Glavtsentrenergo, Glavseverovostokenergo, Minenergo of Kazakhstan and Uzbekistan, and the Azerbaydzhan, Belorussian, Latvian, Turkmen, and Estonian main power supply administrations have achieved fine results this year in decreasing specific fuel expenditure.

The best indicators belong to the Kostromskaya, Lukoml'skaya, Stavropol'skaya, Litovskaya, Surgutskaya, Razdanskaya, Dzhambulskaya, Berezovskaya, Reftinskaya, Zaporozhskaya, Ladyzhinskaya, Belovskaya, Kurakhovskaya, Estonskaya, Voroshilovgradskaya, and Dobrotvorskaya GRES's, and the Irkutskaya TETs-10.

A number of power systems of Glevsevzapenergo/Main Administration of Electric Power Plants and Networks of the North and West/, Glavuralenergo, Glavyuzhenergo, and Minenergo of the Ukrainian SSR are not fulfilling the tasks on lowering the specific expenditures of fuel and have allowed its overexpenditure. The Chuvashskaya, Pavlodarskaya, and several other power systems have indicators that are worse than last year's.

We must specify concrete measures for each electric power station to increase the quality of repairs, to reduce the loss of steam and condensate to acceptable standards, and the air and temperature attachments for departing gases, to provide an optimum vacuum and feed water temperature, and to establish a stricter control over the correct charging of machine units.

All of the collectives must look upon fuel economy as the major task of all economic activities and the organization of socialist competition.

We must improve organizational work on more efficiently utilizing electric and thermal power by all consumers, strengthen control over measures for lowering the power expended during the peak load hours, and also provide a strict discipline in the observance of established limits.

Fuel and power consumers have been obliged to work out and put into practice measures for the utmost decrease in the expenditure of fuel and power resources.

However, the power systems are still inadequately organizing this work. Little is being done to conduct campaigns exposing excesses in the expenditure of electric power in the Orel, Buryat, Ryazan, Kol, Mordov, Tomsk, Karel, and Alma-Ata power system administrations. The power consumers of the Krasnoyarsk, Kuzbass, Kol, Perm, and Karaganda power system administrations have produced very slight savings.

Fuel, electrical and thermal power are a major national property, and the power systems must take a number of additional measures to strengthen daily operational control over electricity-consuming enterprises and organizations, and all of the main consumers. It is necessary to define more precisely with the consumers agreed maximum load levels originating in the established tasks. The main administrations and Gosenergonadzor must keep this under control.

A significant amount of work was carried out in this area last winter and this has helped in regulating the expenditure of electric power and heat.

It is very important that the press, the local radio, and television more widely propagandize advanced know-how on conserving power resources and influence negligent consumers.

Ensuring the introduction of new power capacities is, without a doubt, the major task in the successful preparation of the power facilities for winter.

By 1 December it is important to introduce the following: power blocks 2 and 3 of the Ekibastuzskaya GRES, blocks of the Rovenskaya, Chernobyl'skaya, Smolenskaya, and Kol'skaya AES's, the Syrdar'inskaya, Primorskaya, and Moldavskaya GRES's, TETs-25 of Mosenergo/Moscow power system administration/, the Yuzhnaya TETs of Lenenergo/Leningrad power system administration/, and a number of turbine sets at TETs, 1200-megawatt power blocks of the Kostromskaya GRES, 800-megawatt ones of the Ryazanskaya GRES, and 500-megawatt ones of the Reftinskaya GRES. This is such an especially important task for the solution of which the construction-installation and operational subunits must struggle.

The management and collegium of the ministries and the operational staff regularly scrutinize the course of the work. It is necessary that start-up commissions operate continuously at all projects and that the friendly, joint work of the builders, installers, and operational personnel proceeds.

It is necessary to concentrate on the introduction of the following electric transmission lines: 750 kilowatt--Chernobyl'skaya AES-Zapadnoukrainskaya substation, Smolenskaya-Novobryanskaya substations; 500-kilovolt--Ryazanskaya GRES-Tambov, Kostromskaya GRES-Vologda, Magnitogorsk-Beketovo, Maryyskaya GRES-Karakul', Ust'-Balyk-Dem'yanskoye, Surgut-Ust'-Balyk-Pyt'yakh, Primorskaya GRES-Dal'nevostochnaya substation.

In spite of the complicated conditions of last winter, a majority of the electric power stations, power systems, and power associations basically coped with the power supply job. This is the result of the work carried out on increasing the reliability and lowering the accident proneness of equipment.

The Konakovskaya, Kostromskaya, Lukoml'skaya, Tripol'skaya, Kurakhovskaya, and Iriklinskaya GRES's, the Chernobyl'skaya AES, and many other electric power stations worked dependably in the last maximum load period.

The number of accidents decreased by 10 percent this year. However, it is still impossible to say that the situation regarding accident proneness is satisfactory. Accident proneness has increased at Glavseverovostokenergo, Glavuralenergo, and Minenergo of Kazakhstan and Uzbekistan.

An investigation and analysis of the accidents which have occurred have shown that these accidents have been connected not only with unfavorable yearly conditions, but also with the shortcomings in organizing the operation of a number of electric power stations and in electrical and thermal networks, and with unfinished work on the problems of preparing personnel.

In a number of cases the low-quality repair of equipment, and the neglect in planning and construction have helped accidents to begin and grow.

Turbine accidents have occurred at the Stavropol'skaya, Reftinskaya, Yermakovskaya, and Ladyzhinskaya GRES's because of damage to the vane. Moreover the personnel on duty acted ineffectively and did not stop the damaged machine units in a timely fashion so that, in individual cases, it led to an increase in the amount of damage and a lengthy downtime of equipment in emergency repair.

The measures planned to strengthen anti-accident proneness work in 1980 have been approved by the ministry. These measures must be carried out, without a doubt, by all power systems. The managers of the main operational and production administrations, and republic ministries must strictly control this work.

The reliable and steady work of the associations, especially in the fall-winter maximum load period, depends mainly on the dependable operation of the intersystem electric transmission lines and this requires proper measures for their winterization.

Glavenergokomplekt must give greater attention to equipping the networks with anti-accident proneness automated equipment. The power systems must switch consumers into automated unloading--into SAON [expansion unknown], AChR [frequency-controlled unloading] devices and ensure their work fitness.

The state inspection administration for the operation of electric power stations and networks conducted a selective check of 67 electric power stations and 14 electrical network enterprises from 15 May to 10 June.

The check established that at the Cherepovetskaya, Ryazanskaya, Zaporozhskaya, Yermakovskaya, and Troitskaya GRES's, TETs-14 of Lenenergo, TETs-20 of Mosenergo, and the Saranskaya TETs-2, work on preparing for the fall-winter maximum load period still had not picked up the proper tempo. There has been a whole series of serious criticisms concerning the repair of basic equipment, the operation of the hydraulic ash removal and technical water supply systems, the fuel shop equipment, chemical water purifiers, and the maintenance and repair of buildings and structures.

At a number of the electric transmission lines they are doing a poor job of clearing the route of shrubs, and the replacement of insulators is being delayed.

All of the managers of the main operational, construction, installation, and repair administrations, the power systems and power enterprises must ensure the absolute fulfillment of the decree of the USSR Council of Ministers "Providing the national economy and the population with fuel, electrical and thermal power in the fall-winter period of 1980-81," orders of the minister involved with the preparation of electric power stations, electrical and thermal networks for work in the coming fall-winter maximum load period, aimed at the successful completion of the 1980 tasks.

It is necessary to establish the strictest control over the fulfillment of the order of the minister on preparing power facilities for winter. We must increase the personal responsibility of managers of all ranks for ensuring the execution, fully and within established time periods, of all of the measures of this order.

As never before, a strict discipline is necessary concerning the fulfillment of dispatching regulations without which it is impossible to provide the normal operation of the power systems. The violation of dispatching regulations is a serious fault in operations.

The preparation of power enterprises for winter, the introduction into operation of new power capacities and measures for fulfilling the decree of the USSR Council of Ministers and the directives of the party central committee are of paramount importance and require great attention and great responsibility.

The power workers will do everything which depends on them to provide a reliable power supply for the national economy in the coming fall-winter maximum load period.

8524
CSO: 1822

POWER ENGINEERING: PROGRESS IN NATIONAL ECONOMY

Moscow KRASNAYA ZVEZDA in Russian 26 Jun 80 p 2

[Excerpt from an article by Deputy Director of the power engineering and electrification division of USSR Gosplan A. Troitskiy in the column "Economist's Discussion": "Power Engineering on the Road to Progress"]

[Excerpt] It may be asked: Why build GES's [hydroelectric power plants] in the south and not in regions rich in water resources. Well, because the construction of hydroelectric power plants affects an entire chain of national economic structures: power engineering, irrigation and water transport. GES water storage is still a source of fresh water and a place of recreation for people.

But it is probably most necessary to emphasize the role of power engineering as the basis for distributing productive forces to developmental regions in the north, Siberia and the Far East. Take a look at a map of our country. The Vilyuyskaya GES has become the heart of Mirniy diamond miners in Western Yakutiya. The Bilibinskaya atomic heat and power central has stimulated gold mining in Chukotka. The Bratskaya GES has laid the foundations for economic development of the northern rayons of Irkutskaya Oblast. The cascade GES in Tajikistan has formed a power base for the Yuzhno-Tajikiskiy territorial production complex.

Yet another position of GOELRO [State Commission for the Electrification of Russia] by which the sector is guided as always is the mandatory construction of electric power transmission lines of both local and trunkline designation. Their combination has now made it possible to develop the United Power System of the Soviet Union (EES SSSR) in which there are more than 900 electric power plants with an overall capacity of 210 million kilowatts. Constrolled electronically, they encompass territory in six time zones and yield a gain that is as if existing power plants gained an additional 12 kilowatts of power. The total savings obtained as a result of the operation of EES SSSR amounts to nearly 2 billion rubles per year.

It is important to note that contemporary systems of Soviet electric power engineering are characterized not only by quantitative growth

but also by serious qualitative changes. This refers mainly to the concentration of electric power generation in large-sized electric power plants and units with large individual capacity. In fact, the state obtains large savings of money and fuel from organizing its generation this way. Thus, in the change to 150,000-300,000 kilowatt units, considerably heavier-duty serial power units have appeared. At the Troitskaya state regional electric power station, for instance, a 500,000 kilowatt turbogenerator has already been put into operation while at the Zaporozhskaya and Uglegorskaya state regional electric power stations 800,000 kilowatt units have been installed. Production of a 1.2 million kilowatt unit must be considered an important achievement of power equipment builders. The first such giant is being installed at the Kostromskaya state regional electric power plant.

Without question, the transforming effect of electrification on the country's productive forces and on the living conditions of society will grow steadily. But even now electric power engineering is emerging as the instrument for progressive formation of the structure of the fuel and energy balance of the national economy and of the involvement in it of such efficient resources as nuclear energy, hydropower and the inexpensive low-calorie coals of eastern deposits.

It is well known that our country possesses enormous reserves of mineral fuel. But nature has so arranged it that only 20 percent of the reserves of fuel and hydropower resources are found in the European part of the country where more than three-fourths of the industrial agricultural and other consumers are concentrated. The other 80 percent are located to the east of the Ural Mountains.

Under these conditions, as calculations show, it is more profitable to develop electric power engineering and centralized heat supply in the European part of the country on the basis of nuclear fuel. That is why atomic power plants (AES's) are already being constructed in various regions from the Kol'skiy peninsula to Armenia and from the Baltic Sea region and the Western Ukraine to the land along the Volga.

The task of developing AES's with fast breeder reactors has been set with the goal of efficient use of nuclear fuel. There is a great future for units of this type; burning one form of nuclear fuel, they breed the same quantity of another atomic fuel. At the Beloyarskaya AES work has now begun on the development of this kind of experimental and industrial power unit with a 600,000 kilowatt capacity.

Atomic power plants are greatly superior due to the compactness of nuclear fuel. If we compare two plants identical in capacity (let us say 1 million kilowatt capacity)--one conventional and the other atomic--then each of them will be able to generate 7.5 billion

kilowatt-hours of electric power over a year. But 45,000 carloads of coal must be supplied for operation of a thermal power plant for a year while for the atomic power plant, all of its fuel may be transported at one stroke in just a few carloads, not just for a year but for 2 or 3 years ahead.

But, unfortunately, with all of their advantages even AES's have deficiencies. In particular, they are unable to provide for a dynamic fluctuation in the power of power systems over a day's time.

Hydroelectric power plants solve this problem by the best means. And that is why construction of hydroelectric power plants is being continued along with the construction of AES's in the European part of the country. This is especially true of so-called pumped-storage hydroelectric power plants (GAES's) which basically make it possible to develop "energy stores" by pumping in reserves of water during the night when the load from electric power consumers is lower. In the immediate future construction will begin on the first of such plants, the Zagorskaya GAES near Moscow.

There are plans to develop electric power engineering for the country's eastern regions on the basis of rich local fuel and energy resources, chief among them the exceptionally cheap open-pit coal of the Ekibastuzskoye deposit in Kazakhstan, the Kansko-Achinskoye deposit in Siberia, natural gas of the Tyumenskaya Oblast and also water resources of the great Siberian rivers, the Far East and Central Asia.

The large Ural industrial region has its own characteristics from the point of view of power engineering development. It, as is well known, does not have substantial native fuel and energy resources available, but it adjoins such a fuel base as the Western Siberian gas and oil fields, the Ekibastuzskiy complex and the Kuznetskiy basin. Calculations show that transporting electric power here from the Ekibastuzskaya GRES's [State regional electric power plants] and the GRES being constructed in Tyumenskaya Obast which will operate on local casinghead and natural gas are the most efficient directions for Ural energy provision.

Approaching the conclusion of the discussion, let us note that the basic directions of future development of Soviet power engineering are organically linked with optimization of the country's fuel balance. Implementation of this kind of program is a complicated business, especially since, along with deepening of the processes of electrification, it is necessary to increase the efficiency of utilization of available energy resources in every way possible and to economize on electrical and thermal energy and fuel. The opportunities for this exist. For instance, secondary energy resources are still not

completely utilized. In order to economize on organic fuel, the task has been set of involving in the energy balance such nontraditional resources as solar energy, the underground heat of the Earth, low-potential waste heat, household exhaust and so on.

The extent to which it is important for the economics of the sector and the country as a whole may be judged by this fact alone: reduction of the fuel consumption in generating 1 kilowatt-hour of electric power by just 1 gram will make it possible to save 1 million tons of conventional fuel per year nationwide.

8945
CSO: 1822

ELECTRIC POWER

SANCTIONS RECOMMENDED FOR NONCOMPLIANCE WITH DEADLINES

Moscow STROITEL'NAYA GAZETA in Russian 16 Jul 80 p 2

[Article by correspondent G. Dolzhenko in the column "Managing in a New Way": "Sanctions" Spare me!"]

[Text] The gigantic silhouette of the Rovenskaya atomic cooling tower is visible for many kilometers. But it is impressive not only in size; its productive capacity equals the flow of a large river. One hundred thousand cubic meters of water are pumped per hour.

Not only is the cooling tower unique; many new things are being tried for the first time at the Rovenskaya atomic power plant. A standard design for future mass-produced atomic power plants is being developed on the basic design of this one. Of course, quite a few difficulties are arising for both the builders and the designers. They can be explained to some extent by conditions at the power plant. From the moment when the first cubic meter of concrete was laid in the foundation in August 1976, construction on the projects has been repeatedly delayed. While it is true that they overfulfilled the plan for last year and the first 6 months of this year, the overall delay has not been successfully corrected. The first 220,000 kilowatt power unit which was scheduled to be put on load in 1979 was not delivered. Start-up deadlines were postponed until the middle of 1980 and have been thwarted again. The position with the second power unit of the same capacity is still more complicated.

The situation may be explained only partially by the uniqueness of the projects. A large part of the blame for violation of the deadlines for erecting the plant lies with the builders, designers and suppliers of equipment, structures and materials. Thousands of hours of work time have been lost as a result of incompetent labor management, untimely delivery of equipment for installation and technical documentation and its numerous alterations. Economic controls could have been created with strict measures for strengthening contract discipline and thereby more closely approaching deadlines for making the facilities operational. But they have not. And this is why.

Last year R95 million worth of equipment was needed for the first power unit. In all, 60 million rubles worth was obtained. Were the purchases upset? Yes. But there was not sufficient resoluteness to apply sanctions to the manufacturers. The notorious "fear of spoiling the relationship" had its effect.

"Sanctions?! Put yourself in our place," said director V. Korovkin of the atomic power plant under construction. "We have to work with the main suppliers for more than just one year. We plan to have started up six power units at the plant by 1992. And three of them will be "million kilowatters." In principle, we could sue, let us say, the Izhorskiy plant associations or Elektrosila. The first held up the housing for the reactor and the inner structure units for half a year and the second violated the deadline for manufacturing the grooved parts for the main circulation pumps. But, well, in the future we will have to turn to them more than once with various problems and often the decision will depend on, so to speak, personal relationships. That is why they are spared sanctions."

For the sake of objectivity, it must be noted that the customer himself is not always happy when equipment is received on time; builders are late in delivering items for installation and there is nowhere to store the machinery, especially when it is large.

The reactor housing arrived after a delay--it was unloaded on 9 July--and installation began only in October. For most of 2 months the unit lay under the open sky. Why then hurry the manufacturers? In keeping with the contract commitments, the management could impose sanctions on the general contractor--the administration for construction of the Rovenskaya atomic power plant, the Yuzhatomenergostroy trust--for slow work. But how can this be done when the customer himself sometimes fails to deliver to someone or another on time?

And so, the customer, subcontractor and suppliers live without complicating the relationships between each other. Deadlines are established by polite telephone calls and the contracts or orders, which also have the force of contracts, are forgotten by everyone by general consent. The condition of complacency and magnanimity at the construction site has led to the result that many projects, practically ready to be put into operation, are not submitted on time because of "trifles." The turbines in the machine room have been spinning around for a long time, but the finish work has not been completed on the room. That very unique cooling tower and the main housing have not been turned over for the same reason.

Very recently, employees of the Vladimiretskiy division of the Rovenskaya Oblast office of Stroybank [All-Union Bank for the Financing of Capital Investments] which is financing construction of the atomic power plant

and the Kuznetsovsk village for power engineers made a timid attempt to remind them of their contract obligations. On behalf of the atomic power plant management, they composed two reports dealing with the fact that in the village deadlines were violated in the construction of the main structure of the hospital and polyclinic and the warehouse for industrial and supply stocks which are also to be incorporated into the projected complex. The overall total of the claims amounted to nearly 100,000 rubles. But they encountered a friendly rebuff from... the atomic power plant management whose interests they were, properly, defending. The deputy director for capital construction V. Zenkov boldly wrote in the report: "We consider it unadvisable to levy a fine for objective reasons." The reason, it is true, was not identified, but there is no doubt it would appear very important.

"We all sent the reports for the arbitration of the USSR Ministry of Power and Electrification," said V. Khal'zov in a meeting of the administration of the Stroybank Oblast office, "but we have little faith in success. The fact is that both the customer and the subcontractor as well as the majority of suppliers belong to a single ministry. And moreover, the arbitration is done in that ministry too. What sense is there in transferring money from one pocket to the other? So contracts here do not have the force that they should have. If such claims were investigated by extradepartmental, such as oblast or republic, arbitration, then there would be more action.

And really, sanctions do resemble transferring money from one pocket to the other. But for a large number of lower-level organizations it is far from an indifferent matter which of them works better and which worse. Many are guilty of violating delivery deadlines--designers and suppliers as well as builders. But only the builders have to settle accounts. Last year more than 30,000 rubles were paid to Stroybank by them for extended use of credit.

Legal services should be available to watch over the interests of the organization. Unfortunately, the performance of the legal advisor of the administration of atomic power plant construction is poor. And the managers of the construction project are not blameless. Last year 6,780 rubles were exacted on claims for metal delivery shortages from L'vovmetallosnabsbyt along with a small sum for poor quality products from a number of other plants. But the judge did not even suspect the fact that last year a number of plants underdelivered large consignments of metal structures and precast reinforced concrete and it was necessary to arouse them to material responsibility.

In a resolution of the CPSU Central Committee and the USSR Council of Ministers on improving the economic mechanism, it was emphasized that sanctions intended for violations of contract obligations should be applied without fail. And here a special task is placed on the Stroybank establishment. They must strictly suppress cases of mutual amnesty. Apparently, an arrangement must be established whereby fines are withheld automatically by Gosbank or Stroybank institutions while the investigation of claims on especially vital construction projects is undertaken by extradepartmental arbitration.

ELECTRIC POWER

CONSTRUCTION PROJECTS BRING ELECTRIC POWER TO FAR EAST

Moscow KOMSOMOL'SKAYA PRAVDA in Russian 12 Aug 80 p 2

[Article by Candidate of Economic Sciences M. Krayeva and Candidate of Economic Sciences V. Turetskiy of the Institute of Economic Research of the Far Eastern Scientific Center of the USSR Academy of Sciences in the column "Siberia and the Far East; Experience, Analysis and Search": "Bridges of Energy"]

[Text] The urgent appeal for young builders of all generations to "Volunteer!" was recently heard again in Primor'ya. On the map of urgent Komsomol construction projects there is yet another frontier--a 500 kilovolt power transmission line. Its route extends from north to south across marshes, mountain ridges and the Ussuriyskaya taiga. Teams of young volunteers are cutting a clearing across the taiga and are preparing foundations under poles for the future electric power transmission line. But this construction project is urgent not only for the young Primorians; hundreds of industrial concerns, design institutes and construction trusts are participating in laying out the course for the electric power transmissions line from Luchegorska to the Dal'ne Vostochnaya substation. Power should arrive in the south of Primor'ya as early as this year.

What has brought about such efficiency in the construction of the electric power transmission line? With an expansion in the power of the Primorskaya GRES [State regional electric power plant], the abundance of power to the north of the border will increase while its acute shortage is felt immediately to the south. This situation is not peculiar to the Far East. Rather, it is characteristic of the development of fuel and power systems here. For instance, KOMSOMOL'SKAYA PRAVDA has already written about the fact that in the construction zone of the Baykal-Amur Mainline hundreds of low-power electric power plants of different departments are burning thousands of tons of diesel fuel while at the Zeyskaya GES [hydroelectric power plant] they are looking for power users. There are various reasons for this kind of situation: exploratory work is delayed, new electric power transmission line plans are not available, interdepartmental divisiveness, etc.

In addition, development of the productive forces of the Far East in recent years has been accompanied by a considerable growth in the consumption of energy resources. Let us cite these figures: the production of electric power during the last 15 years has increased 3.5-fold in the region as a whole, the extent of electrification of industrial labor has more than doubled and the consumption of electric power in agriculture has increased eight-fold.

But, in spite of the higher, compared with the union-wide level, rates of increase in the generation of electric power in all krays and oblasts of the Far East, an extremely tense situation has developed here in providing electric power to sectors of the national economy. Miscalculations of previous years are to blame. In the process of forming a united power system, disproportions have arisen in the development of electric power plants and the construction of electric power transmission lines. At present there is a great problem in supplying electric power to the Khabarovskoy and Komsomol'skiy power regions as well as the southern part of Primor'ya.

In the next 10 years a considerable increase in power is anticipated in the united power system of the Far East due to incorporation of units into the Bureyskaya GES. Consequently, the situation in transmitting power to consumers may be repeated if supply line construction proceeds as slowly as it is doing right now.

The problems will increase in the 11th Five-Year Plan. Therefore, it is necessary to be prepared to solve them even today. Take, for instance, the Komsomol'skiy industrial center. As far as development here, the consumption of energy resources will be increased. Calculations show that the most promising solution of the fuel and power problem of this very large center in the Far East is the delivery here of Sakhalin gas. It will be necessary to construct a gas pipeline from Okha to Komsomol'sk to supply the center completely with high-quality technological and general-use fuel as well as raw materials for the chemical industry (primarily for the production of nitrogen fertilizers).

Further development of Sakhalin resources will permit an increase in oil and natural gas extraction in the region. But along with this there will be an increase in supplies of oil to the Far East from Siberian regions. This means that it will be necessary to increase the throughput capacity of railroad transport. The Baykal-Amur Mainline which is under construction will make it possible to accomplish this vital task successfully. However, for deliveries of oil to the southern parts of the region, it will apparently be necessary to consider construction of an oil pipeline from Urgal to Nakhodka. An increase in the capacity of oil refineries, particularly as a result of expansion of the Komsomol'skiy-na-Amur and of the construction of a new plant in the Nakhodka region will permit an increase in the reliability and efficiency of oil product provision for the eastern regions.

In the Far East today coal is the principal and predominant energy resource, accounting for 50 percent of the total balance. Calculations made by our institute confirm the economic efficiency of maximum satisfaction of the region's demand for coal by means of local resources. The delivery of Neryungrinskiy fuel coals here from Yakutiya has also proved valuable. All of these require prompt measures to ensure rapid development of the Far Eastern coal industry. Geological exploration, design and scientific research work must be considerably accelerated and, in addition, highly-efficient specialized construction organizations with an appropriate production base must be created.

Development of nontraditional energy sources will have a vital importance. For instance, Kamchatka has large reserves of geothermal energy. There are plans to construct a second geothermal heat and power central, the Mutnovskaya, here. Enormous energy reserves are wasted in the ocean itself. At p esent, planning and exploratory work is being done on the coast of the Okhotskiy Sea for the purpose of forming an economic foundation for constructing two tidal electric power plants.

It would not be exaggeration to say that the power engineering of our country is being accomplished through the energy of young hearts. Really, all the largest construction projects for atomic and hydroelectric power plants have been announced by shock-komsomols. Komsomol supervision over power engineering construction projects is evident by the rapidity of their construction. It appears that new unionwide urgent Komsomol construction projects will come into being soon in the Far East too, in the place where its future power engineering will be established.

8945
CSO: 1822

UKRAINIAN COAL PRODUCTION FOR THE FIRST QUARTER 1980

Kiev UGOL' UKRAINY in Russian No 6, Jan 80 pp 45-47

[Article: "The Ukrainian Coal Industry in the First Quarter of 1980"]

[Text] The mine workers of the republic became actively involved in socialist competitions to fulfill the coal extraction plan ahead of schedule, raise production efficiency, and improve the quality of work from the very first days of the final year of the 10th Five-Year Plan. In the first quarter numerous mines, extraction sections, and brigades had already reported fulfillment of their five-year plan assignments ahead of schedule. The quarterly plan of coal extraction for the Ukrainian Ministry of Coal Industry was 101.5 percent fulfilled. About 750,000 tons of fuel beyond the plan was sent up. The plan of extraction of coking coal was 105.1 percent fulfilled.

As Table No 1 below shows, on 1 April 1980 the republic coal industry had 1,722 working faces, 17 more than in the first quarter of 1979. The average operating line of working faces increased 1.3 kilometers, reaching 258.8 kilometers. The average monthly advance of working faces was 34.9 meters, and the average daily extraction from one face was 349 tons.

The 606 fully mechanized working faces produced 26.96 million tons of coal or 56.7 percent of total extraction. Seams with dip angles up to 35 degrees had 549 fully mechanized longwalls equipped with combines and cutters; this is 47 units more than in the first quarter of 1979. Coal extraction was 26.13 million tons, reaching a level of 61.7 percent. The average daily load per longwall was 607 tons (see Table 2 below). In seams with dip angles of greater than 35 degrees 57 fully mechanized working spaces were operated, six more than in the comparable period. Coal extraction was 830,000 tons, which was 15.8 percent compared to 14.6 percent in the first quarter of 1979. The average daily load was 182 tons. The 75 cutter longwalls on seams with dip angles up to 35 degrees produced 1.56 million tons with an average daily load of 266 tons.

Table 1

Производственные объединения (1)	Добыча угля, тыс. т (2)	Кол-во действующих очистных забоев (3)	Среднесут. длина очистного забоя, км (4)	Среднемесячное подвигание действующих очистных забоев, м (5)	Суточная нагрузка, т (6)	
					на действующий забой (7)	на шахту, рудник (8)
Донецкуголь (a)	5498	2882	34,27	30,4	342	3034
Макеевуголь (b)	3792	141	22,04	31,0	315	2982
Красноармейскуголь (c)	3195	80	13,31	39,8	466	3491
Добропольеуголь (d)	2867	44	7,68	63,1	875	3940
Артемуголь (e)	197	225	23,99	30,3	146	2172
Орджоникидзеуголь (f)	1507	104	11,36	30,2	162	1793
Шахтерскантрацит (g)	3001	107	19,36	29,4	331	1919
Торезантрацит (h)	2881	96	14,94	32,3	353	2038
Ворошиловградуголь (i)	2958	76	12,33	40,0	441	3027
Стахановуголь (j)	2325	118	18,53	25,0	226	1602
Первомайскуголь (k)	2321	94	15,90	26,2	312	1695
Краснодонуголь (l)	2267	54	7,94	47,1	463	2744
Донбассантрацит (m)	5536	165	27,31	32,6	391	2695
Свердловантрацит (n)	2361	42	6,51	52,4	636	2149
Павлоградуголь (o)	2706	65	9,57	57,3	527	3218
Укрзападуголь (p)	3792	102	12,78	46,8	521	2142
Александриявуголь (q)	2114	12	0,93	50,5	716	3561
Минуглепром УССР (r)	52003	1722	258,78	31,9	349	2107

Key:
(1) Production Associations;
(2) Coal Extraction, thousands of tons;
(3) Number of Working Faces;
(4) Average Operating Line of Working Faces, kilometers;
(5) Average Monthly Advance of Working Faces, meters;
(6) Daily Load, tons;
(7) Per Working Face;
(8) Per Open-Cut Mine (Administrative Unit);
(a) Donetskugol' [Donetsk Coal];
(b) Makeyevugol' [Makeyevka Coal];
(c) Krasnoarmeyskugol' [Krasnoarmeysk Coal];
(d) Dobropol'yeugol' [Dobropol'ye Coal];
(e) Artemugol' [Artemovo Coal];
(f) Ordzhonikidzeugol' [Ordzhonikidze Coal];
(g) Shakhterskantratsit [Shakhtersk Anthracite];
(h) Torezantratsit [Torez Anthracite];
(i) Voroshilovgradugol' [Vorshilovgrad Coal];
(j) Stakhanovugol' [Stakhanov Coal];
(k) Pervomayskugol' [Pervomaysk Coal];
(l) Krasnodonugol' [Krasnodon Coal];
(m) Donbassantratsit [Donets Basin Anthracite];
(n) Sverdlovantratsit [Sverdlovo Anthracite];
(o) Pavlogradugol' [Pavlograd Coal];
(p) Ukrzapadugol' [Western Ukrainian Coal];
(q) Aleksandriyaugol' [Aleksandriya Coal];
(r) Ukrainian SSR Ministry of Coal Industry.

Table 2

Производственные объединения (1)	(2) Комплексно-механизированные забои, оборудованные комбайнами и струга-ми, на пластах с углом падения до 35°			
	Кол-во (3)	Добыча, тыс. т (4)	Уро-вень, % (5)	Нагрузка на лаву, т в сутки (6)
Донецкуголь (a)	50	2477	46,5	602
Макеевуголь (b)	40	1874	53,9	568
Красноармейскуголь (c)	55	2075	72,3	491
Добропольеуголь (d)	31	2291	85,8	1033
Шахтерскантрацит (g)	21	891	30,6	510
Торезантрацит (h)	47	1801	69,0	479
Ворошиловградуголь (i)	28	1580	61,6	657
Стахановуголь (j)	17	532	27,3	368
Первомайскуголь (k)	16	574	29,5	438
Краснодонуголь (l)	30	1701	89,9	682
Донбассантрацит (m)	48	2420	48,2	671
Свердловантрацит (n)	36	2071	96,0	716
Павлоградуголь (o)	56	2439	93,7	562
Укрзападуголь (p)	62	2841	77,6	648
Александриявуголь (q)	12	562	100,0	716
Минуглепром УССР (r)	549	26 132	61,7	607

Key: (1) Production Associations;
(2) Fully Mechanized Faces Equipped with Combines and Cutters for Seams with Dip Angles up to 35 Degrees;
(3) Number;
(4) Extraction, thousands of tons;
(5) Level, percentage;
(6) Load per Longwall, tons per day
[Lettered entries same as Table 1; see Key of Table 1 above].

Table 3 (below) shows that the mines of the republic cut 754.3 kilometers of all types of preparatory excavation, which was 18.8 kilometers more than the plan indicator. Attention was concentrated on mechanization of cutting work. The level of mechanization of preparatory excavation rose by 1.4 percent to 78.2 percent, and the level of combine cutting increased 2.8 percent to 23.9 percent (see Table 4 below).

Table 5 (below) shows the results of work by Ukrainian coal concentrating workers. The table shows that the concentrating factories of the Ukrainian SSR Ministry of Coal Industry processed 32.54 million tons of ordinary coal and produced 19.28 million tons of concentrate. The output of coals of large and medium grades was 5.63 million tons, 4.17 million tons of that being anthracite. Almost 3 million tons of coal was processed in mechanized sorting units. The plan for production of hard coal briquettes was overfulfilled; the plan for brown coal briquettes was underfulfilled.

Table 3

Производственные объединения (1)	(2) Проведение подготовительных выработок					
	(3) всего			(4) вскрывающих и подготавливающих		
	План, км (5)	Факт, км (6)	% к плану (7)	План, км (5)	Факт, км (6)	% к плану (7)
Донецкуголь (a)	75.6	77.7	102.8	55.0	56.0	101.8
Макеевуголь (b)	55.4	56.0	101.0	38.5	38.6	100.3
Красноармейскуголь (c)	42.0	40.5	96.4	36.7	34.2	93.2
Добропольеуголь (d)	45.9	52.4	114.2	31.0	31.2	100.7
Артемуголь (e)	82.7	83.3	100.7	41.9	42.8	102.1
Орджоникидзеуголь (f)	31.4	33.6	107.0	18.3	18.2	99.5
Шахтерскантрацит (g)	38.6	38.6	100.0	25.5	25.9	101.6
Торезантрацит (h)	32.1	34.7	108.1	21.5	22.3	103.7
Ворошиловградуголь (i)	42.6	43.7	102.6	25.3	25.5	100.8
Стахановуголь (j)	51.3	52.2	101.7	30.2	30.5	101.0
Первомайскуголь (k)	40.6	39.0	96.1	28.9	27.7	95.8
Красноармейскуголь (l)	30.7	31.9	103.9	20.9	19.8	94.7
Донбассантрацит (m)	66.4	69.0	105.5	37.7	38.1	101.1
Свердловантрацит (n)	27.0	28.3	104.8	18.2	18.5	101.6
Павлоградуголь (o)	31.9	31.3	98.1	30.0	29.2	97.3
Укрзападуголь (p)	34.8	34.8	100.0	29.4	29.6	100.7
Александрияуголь (q)	7.6	7.3	96.1	7.0	6.6	94.3
Минуглепром УССР (r)	735.5	754.3	102.6	496.0	494.7	99.7

Key: (1) Production Associatons;
(2) Preparatory Excavation;
(3) Total;
(4) Removing Overburden and Preparation;
(5) Plan, kilometers;
(6) Actual, kilometers;
(7) Percentage of Plan;
[Lettered entries same as Table 1; see Key of Table 1 above].

The leading extraction and shaft-cutting brigades worked well in the first quarter of the final year of the 10th Five-Year Plan. The number of extraction brigades that reached 1,000 tons of coal and more a day per longwall 115 (compared to 105 in the first quarter of 1979) and the number of shaft-cutting brigades that achieved high rates of preparatory excavation rose to 227 (compared to 213 in the first quarter of 1979). Among the winners in socialist competition were the extraction brigades of A. D. Polishchuk (Trudovskaya mine), N. N. Skrypkin (Mining Administration imeni Frunze) V. I. Ignat'yev (Krasnolimanskaya mine), A. A. Asyutchenko (mine imeni Gazety "Sotsialisticheskiy Donbass"), V. M. Barischenko (Mine Administration imeni Lenin), A. Ya. Kolesnikov (Molodogvardeyskaya mine), V. N. Pikhterev (Mine imeni Abakumov), and S. I. Smolov ("Mine imeni XXV S"yezda KPSS), among others and the shaft-cutting collectives of V. G. Vendilovich (Mine imeni Abakumov), I. M. Namuov, N. Ye. Stepin (Krasnolimanskaya mine), D. G. Khomich (Chervona Zirka mine), and V. M. Vernigorov (Pavlogradskaya mine), among others.

Table 4

Производственные объединения (1)	(2) Проведение подготовительных выработок с механизированной погрузкой угля				
	План, км (3)	Факт., км (4)	В % к общей длине проведимых выработок, где требуется погрузка (5)	(6) Комбайнами	
				План, км (3)	Факт., км (4)
Донецкуголь (a)	59.2	61.7	79.4	21.3	20.0
Макеевуголь (b)	39.4	40.1	75.1	13.6	13.8
Красноармейскуголь (c)	31.9	31.0	76.4	11.6	11.6
Добропольеуголь (d)	43.9	50.5	96.4	32.1	35.2
Артемуголь (e)	40.5	41.0	100.0	2.4	2.0
Орджоникидзеуголь (f)	17.3	17.3	95.1	0.3	0.1
Шахтерскантрацит (g)	24.5	25.0	64.8	7.0	7.0
Торезантрацит (h)	20.6	22.5	67.4	2.1	1.4
Ворошиловградуголь (i)	30.0	31.1	78.5	6.8	6.0
Стахановуголь (j)	34.5	36.1	81.7	1.0	1.1
Первомайскуголь (k)	24.7	24.2	65.2	4.2	1.3
Краснодонуголь (l)	20.5	20.9	82.6	6.5	4.6
Донбассантрацит (m)	33.5	34.5	56.8	2.5	2.5
Свердловантрацит (n)	17.7	18.6	65.7	0.4	0.4
Павлоградуголь (o)	30.6	30.6	96.1	28.8	28.8
Укрзападуголь (p)	28.1	28.2	81.0	18.1	17.2
Александрияуголь (q)	6.3	5.8	79.5	6.3	5.8
Министерство (r)	504.0	519.1	78.2	161.0	158.8

Key: (1) Production Associations;
(2) Preparatory Excavation with Mechanized Coal Loading;
(3) Plan, kilometers;
(4) Actual, kilometers;
(5) Percentage of Total Length of Excavations Where Loading Is Required;
(6) By Combines;
[Lettered entries same as Table 1; see Key of Table 1 above].

For the Ukrainian SSR Ministry of Coal Industry as a whole the planned volume of state capital investment was 103 percent incorporated, which included 102 percent of the plan for construction-installation work. The plan for incorporating capital investment for production facilities was 106 percent fulfilled, including 104 percent for construction-installation work.

Table 5

Производственные объединения (1)	Переработка рядового угля на ОФ, тыс. т (2)	Выпуск концентрата, тыс. т (3)	Выход концентрата, % (4)	Выпуск крупно-средних сортов, тыс. т (5)	
				углей (6)	антрацитов (7)
Донецкуголь (a)	623,4	194,2	31,2	141,8	—
Красноармейскуголь (c)	167,5	122,5	73,1	32,1	—
Добропольеуголь (d)	223,2	117,3	52,6	26,8	—
Шахтерскантрацит (g)	1033,6	425,7	41,2	—	505,5
Торезантрацит (h)	2734,2	1186,6	43,5	—	959,0
Донецкуглеобогащение (s)	12 750,9	8789,9	68,9	431,7	267,8
Первомайскуголь (k)	868,7	382,3	44,0	382,3	—
Донбассантрацит (m)	5247,6	2501,6	47,7	—	1841,3
Свердловантрацит (n)	1474,3	591,9	40,1	—	591,9
Ворошиловградуглеобогащение (t)	6517,6	4355,8	66,8	176,4	—
Павлоградуголь (o)	806,5	499,2	61,9	182,1	—
Западдуголь (p)	94,6	54,1	57,2	92,2	—
Минуглепром УССР (r)	32 542,1	19 223,1	59,1	1465,4	4165,5

Key: (1) Production Associations;
(2) Processing of Regular Coal for Concentrating Factories, thousands of tons;
(3) Production of Conc ntrate, thousands of tons;
(4) Yield of Concentrate, percentage;
(5) Production of Large-Medium Grade, thousands of tons;
(6) Coals;
(7) Anthracites;
[For lettered entries (a) through (r) see Key of Table 1 above];
(s) Donetskugleobugashcheniye [Donetsk Coal Concentrating]
(t) Voroshilovgradugleobogashcheniye [Voroshilovgrad Coal Concentrating].

11,176
CSO:1822

UKRAINIAN COAL PRODUCTION FOR FIRST SIX MONTHS OF 1980

Kiev UGOL' UKRAINY in Russian No 9, Sep 80 pp 45-46

[Article: "The Coal Industry of the UKRAINIAN SSR in the First Half of 1980"]

[Text] The collectives of the Donetskugol' [Donetsk Coal], Dobropol'yeugol' [Dobropol'ye Coal], Artemugol' [Artemovo Coal], Ordzhonikidzeugol' [Ordzhonikidze Coal], Shakhterskantratsit [Shakterak Anthracite], Torezantratsit [Torez Anthracite], Voroshilovgradugol' [Voroshilovgrad Coal], Krasnodonugol' [Krasnodon Coal], and Pavlogradugol' [Pavlograd Coal] fulfilled their plans for coal extraction in the first six months of the final year of the 10th Five-Year Plan. Many leading mines, sections, and brigades reported completion of their five-year plan assignments for fuel extraction ahead of schedule. The brigades which have reached a production level of 1,000 tons of coal and more a day and the shaft-cutting brigades that are working on stepped-up schedules operated successfully.

But not all associations were able to handle their established assignments for coal extraction. For the Ukrainian SSR Ministry of Coal Industry as a whole, coal extraction in the first six months of 1980 was 100.86 million tons (99.6 percent of the plan).

The republic coal industry on 1 July 1980 had 1,703 operating faces (table 1 below), the average operating line of working faces was 257.52 kilometers, the average monthly advance of operating working faces was 33.7 meters, and the average daily extraction per longwall was 337 tons.

In the final year of the five-year plan considerable attention was given to technical progress in underground and open-cut mines, in particular to full mechanization of production processes. Thus, the number of fully mechanized longwalls rose from 574 in the first six months of 1979 to 610 in the same period of 1980, an increase of 6.3 percent; this breaks down into an increase from 518 to 546 for seams

Table 1

Производственные объединения (1)	Добыча угля, тыс. т (2)	Кол-во действующих очистных забоев (3)	Среднегодовое (списочное) количество действующих очистных забоев, ед (4)	Среднесуточное подвигание действующих очистных забоев, м (5)	Суточная нагрузка, т (6) на действующий забой (7)	Суточная нагрузка, т (6) на шахту, разрез (как ед.) (8)
Донецкуголь (a)	10 836	198	34,38	29,6	333	2974
Макеевуголь (b)	7 288	143	21,87	29,3	299	2818
Красноармейскуголь (c)	6 322	80	13,20	40,3	466	3440
Добропольеуголь (d)	5 623	43	7,68	61,3	836	3839
Артемуголь (e)	5 659	225	23,61	29,4	143	2122
Орджоникидзеуголь (f)	2 982	99	11,11	29,7	160	1755
Шахтерскантрацит (g)	5 758	104	18,99	28,5	318	1824
Торезантрацит (h)	5 634	98	15,17	30,3	338	1905
Ворошиловградуголь (i)	5 686	75	12,13	38,9	425	2858
Стахановуголь (j)	4 351	120	18,48	24,1	214	1511
Первомайскуголь (k)	4 175	82	15,43	24,3	289	1550
Краснодонуголь (l)	4 415	56	8,03	44,1	444	2707
Донбассантрацит (m)	10 751	160	27 13	31,4	378	2633
Свердловантрацит (n)	4 341	41	6,57	49,1	599	2011
Павлоградуголь (o)	5 292	65	9,69	53,6	512	3157
Укрзападуголь (p)	7 439	102	13,00	45,2	499	2085
Александрияуголь (q)	4 310	12	0,97	53,8	771	3653
Минуглепром УССР (r)	100 864	1703	257,52	33,7	337	2416

Key: (1) Production Associations;
(2) Coal Extraction, thousands of tons;
(3) Number of Working Faces in Operation;
(4) Average Operating Line of Working Faces, kilometers;
(5) Average Daily Advance of Operating Working Faces, meters;
(6) Daily Load, tons;
(7) Per Operating Face;
(8) Per Open-Cut Mine (Administrative Unit);
(a) Donetskugol' [Donetsk Coal];
(b) Makeyevugol' [Makeyevka Coal];
(c) Krasnoarmeyskugol' [Krasnoarmeysk Coal];
(d) Dobropol'yeugol' [Dobropol'ye Coal];
(e) Artemugol' [Artemovo Coal];
(f) Ordzhonikidzeugol' [Ordzhonikidze Coal];
(g) Shakhterskantratsit [Sakhtersk Anthracite];
(h) Torezantratsit [Torez Anthracite];
(i) Voroshilovgradugol' [Vorshilovgrad Coal];
(j) Stakhanovugol' [Stakhanov Coal];
(k) Pervomayskugol' [Pervomaysk Coal];
(l) Krasnodonugol' [Krasnodon Coal];
(m) Donbassantratsit [Donets Basin Anthracite];
(n) Sverdlovantratsit [Sverdlovo Anthracite];
(o) Pavlogradugol' [Pavlograd Coal];
(p) Ukrzapadugol' [Western Ukrainian Coal];
(q) Aleksandriyaugol' [Aleksandriya Coal];
(r) Ukrainian SSR Ministry of Coal Industry.

with a dip angle of up to 35 degrees and from 56 to 64 for seams of greater than 35 degrees dip. Coal extraction from fully mechanized working faces in seams with dip angles of up to 35 degrees was 50.61 million tons or 61.6 percent of all extraction from these seams (see Table 2 below). The average daily load per longwall was 582 tons.

Table 2

Производственные объединения (1)	(2)			
	Количество (3)	Добыча, тыс. т (4)	Уровень, % (5)	Нагрузка на забой, т в сутки (6)
Донецкуголь (a)	46	4700	44.9	575
Макеевуголь (b)	37	3510	52.9	636
Красноармейскуголь (c)	56	4220	73.8	490
Добропольеуголь (d)	30	4482	85.6	981
Шахтерскантрацит (g)	20	1671	29.9	488
Торезантрацит (h)	47	3456	67.9	447
Ворошиловградуголь (i)	29	3047	61.6	628
Стахановуголь (j)	16	967	26.5	349
Первомайскуголь (k)	16	1051	30.3	422
Краснодонуголь (l)	32	3318	90.7	659
Донбассантрацит (m)	50	4788	49.5	638
Свердловантрацит (n)	36	3826	95.4	670
Павлоградуголь (o)	57	4753	93.8	544
Укрзападуголь (p)	62	5595	77.8	617
Александриявуголь (q)	12	1226	100.0	771
Минуглепром УССР (r)	545	50610	61.8	582

Key: (1) Production Associations;
(2) Fully Mechanized Faces Equipped with Combines and Cutters in Seams with Dip Angles up to 35 Degrees;
(3) Number;
(4) Extraction, thousands of tons;
(5) Level, percentage;
(6) Load per Longwall, tons a day;
[Lettered entries same as Table 1; see Key of Table 1 above].

From inclined and steep seams coal extraction from fully mechanized working faces reached 1.75 million tons with an average daily load of 182 tons of coal. The 74 cutter-type longwalls in seams with dip angles up to 35 degrees produced 3.12 million tons of coal with an average daily load per face of 261 tons.

Table 3 below shows the indicators of preparatory excavation work. The plan for all preparatory excavation for the Ukrainian SSR Ministry of Coal Industry was 100.6 percent fulfilled with 8.9 kilometers of excavation beyond the assignment. The plan for removal of overburden and preparation was 98.5 percent fulfilled. The plan for preparatory excavation using mechanized coal and rock loading was fulfilled by 100.1

Table 3

Производственные объединения (1)	(2) Проведение подготовительных выработок					
	(3) всех			(4) вскрышных и подготовительных		
	План, км	Факт., км	% к плану	План, км	Факт., км	% к плану
	(5)	(6)	(7)	(5)	(6)	(7)
Донецкуголь (a)	148,0	152,9	102,8	107,5	109,1	101,5
Макеевуголь (b)	111,4	111,8	100,4	78,7	78,7	100,0
Красноармейскуголь (c)	83,5	76,7	92,0	71,9	63,6	88,5
Добропольеуголь (d)	92,3	101,5	110,0	62,6	62,9	100,5
Артемуголь (e)	162,1	163,4	100,8	82,3	84,0	102,1
Орджоникидзеуголь (f)	62,5	65,7	105,1	36,6	36,7	100,3
Шахтерскантрацит (g)	76,7	75,2	98,0	51,2	50,3	96,3
Торезантрацит (h)	65,1	67,6	103,8	43,1	44,4	103,2
Ворошиловградуголь (i)	85,8	86,1	100,4	50,8	50,6	99,6
Стахановуголь (j)	101,4	102,3	100,9	60,3	60,4	100,2
Первомайскуголь (k)	81,0	74,2	91,6	57,7	52,8	91,5
Краснодонуголь (l)	61,1	61,1	100,0	41,8	39,5	94,5
Донбассантрацит (m)	134,8	140,0	104,0	76,3	76,2	99,9
Свердловантрацит (n)	54,4	53,5	98,3	36,7	35,8	97,4
Павлоградуголь (o)	64,3	63,2	98,3	60,7	59,1	97,4
Укрзападуголь (p)	60,8	67,9	98,0	58,5	57,7	98,6
Александрвуголь (q)	15,1	14,9	98,7	14,0	13,5	96,4
Минуглепром УССР (r)	1468,4	1477,3	100,6	988,7	973,9	98,5

Key: (1) Production Associations;
(2) Preparatory Excavation;
(3) All;
(4) Removal of Overburden and Preparation;
(5) Plan, kilometers;
(6) Actual, kilometers;
(7) Percentage of Plan;
[Lettered entries same as Table 1; see Key of Table 1 above .

---

percent, with 1.4 kilometers of excavation beyond the plan (see Table 4 below) which was 77.8 percent of the total volume of excavation requiring loading. Table 5 below presents the results of work by coal concentration workers in the republic. The concentrating factories of the Ukrainian SSR Ministry of Coal Industry processed 65.7 million tons of coal in the first six months, produced 38.96 million tons of concentrate and 11.36 million tons of large and medium grades of coal, including 8.34 million tons of anthracites. Mechanized sorting units processed 5.6 million tons of coal, 103 percent of the plan. The plan for production of hard coal briquettes was overfulfilled; the plan for production of brown coal briquettes was underfulfilled.

The leading extraction and shaft-cutting brigades worked well in the first six months: 104 brigades produced 1,000 tons of coal and more a day per longwall and 212 collectives did excavation work at an accelerated pace.

Table 4

Производственные объединения (1)	(2) Проведение подготовительных выработок с механизированной погрузкой				
	План., км (3)	Факт., км (4)	% к общей длине проведения выработок, где требуется погрузка (5)	(6) комбайнами План., км (3)	(6) комбайнами Факт., км (4)
Донецкуголь (a)	118,3	120,1	78,9	43,1	41,9
Макеевуголь (b)	78,9	79,1	73,8	27,4	27,9
Красноармейскуголь (c)	63,6	59,5	77,6	23,4	21,7
Добропольеуголь (d)	88,4	98,9	96,5	64,4	69,4
Артемуголь (e)	80,3	80,3	100,0	4,9	3,8
Орджоникидзеуголь (f)	34,6	33,4	91,5	0,7	0,1
Шахтерскантрацит (g)	48,8	49,7	85,9	14,8	13,6
Торезантрацит (h)	41,7	43,9	66,8	4,4	2,6
Ворошиловградуголь (i)	60,3	62,0	79,5	14,1	13,3
Стахановуголь (j)	69,5	69,6	80,5	2,0	2,1
Первомайскуголь (k)	50,1	44,4	62,6	8,8	3,3
Краснодонуголь (l)	41,1	39,6	81,3	13,1	8,4
Донбассантрацит (m)	69,2	69,2	56,5	5,2	4,8
Свердловантрацит (n)	35,8	38,0	67,3	0,9	0,6
Павлоградуголь (o)	61,5	61,5	97,6	58,1	58,1
Укрзападуголь (p)	57,2	54,5	80,3	36,0	31,9
Александриявуголь (q)	12,7	11,7	78,5	12,7	11,7
Минуглепром УССР (r)	1012,0	1013,4	77,8	334,0	315,2

Key: (1) Production Associations;
(2) Preparatory Excavation Work with Mechanized Loading;
(3) Plan, kilometers;
(4) Actual, kilometers;
(5) Percentage of Total Length of Excavation Requiring Loading;
(6) By Combine:
[Lettered entries same as Table 1; see Key of Table 1 above].

In socialist competition for successful fulfillment of the assignments of the final year of the 10th Five-Year Plan new labor accomplishments were achieved by the brigades of V. G. Murzenko of the Krasnyy Partizan mine (which sent up 654,100 tons of coal in the first six months against an obligation of 605,000 tons), N. N. Skrypkin of the Mine Administration imeni Frunze (526,410 compared to an obligation of 515,000 tons), A. Ya. Kolesnikov of the Molodgardeyskaya mine (472,800 tons against an obligation of 467,500), A. D. Polishchuk of the Trudovskaya mine (388,500 tons compared to an obligation of 376 700), A. A. Asyutchenko of the mine imeni Gazety "Sotsialisticheskiy Donbas" (311,300 tons compared to an obligation of 276,600 tons), G. I. Motsak of the Mine imeni Kosmonavtov (286,400 tons against an obligation of 258,900 tons), and G. G. Avraimov of the Mine imeni RKKA (237,900 tons compared to an obligation of 235,100 tons), and the shaft-cutting collectives of D. G. Khomich (Chervona Zirka mine), V. G. Vendilovch (Mine imeni Abakumov), I. M. Naumov (Znamya Kommunizma Mine Administration), and V. M. Vernigorov (Pavlogradskaya mine), among others.

Table 5

Производственные объединения (1)	Переработка рядового угля на ОФ, тыс. т (2)	Выпуск концентрата, тыс. т (3)	Выход концентрата, % (4)	Выпуск крупно-средних сортов, тыс. т (5)	
				углей (6)	антрацитов (7)
Донецкуголь (a)	1 273,5	390,1	30,6	282,9	—
Красноармейскуголь (c)	301,4	224,1	74,4	64,9	—
Добропольеуголь (d)	433,9	228,8	52,7	55,6	—
Шахтерскантрацит (g)	2 018,9	840,0	41,6	—	1000,2
Горезантрацит (h)	5 400,3	2 348,9	43,4	—	1885,5
Донецкуглеобогащение (s)	25 699,3	17 767,8	69,1	920,5	537,2
Первомайскуголь (k)	1 647,3	711,4	43,2	711,4	—
Донбассантрацит (m)	10 710,0	5 138,9	47,9	—	3766,1
Свердловантрацит (n)	2 865,4	1 149,4	40,1	—	1149,6
Ворошиловградуглеобогащение (t)	12 748,8	8 541,6	67,0	342,7	—
Павлоградуголь (o)	1 600,3	976,7	61,0	349,3	—
Укрзападуголь (p)	1 000,0	668,6	66,9	289,8	—
Минуглепром УССР. (r)	65 699,1	38 965,1	59,3	3017,1	8338,6

Key: (1) Production Associations;
(2) Processing of Ordinary Coal for Concentrating Factories, thousands of tons;
(3) Production of Concentrate, thousands of tons
(4) Output of Concentrate, percentage;
(5) Production of Large and Medium Grade, thousands of tons;
(6) Coals;
(7) Anthracites;
[For lettered entries (a) through (r) see Key of Table 1 above];
(s) Donetskugleobugashcheniye [Donetsk Coal Concentrating]
(t) Voroshilovgradugleobogashcheniye [Voroshilovgrad Coal Concentrating].

The planned volume of state capital investment for the Ukrainian SSR Ministry of Coal Industry as a whole was 97 percent incorporated, including 96 percent for construction and installation work. For production facilities the plan of capital investment incorporation was 99 percent fulfilled, including 98 percent for construction and installation work.

11,176
CSO:1822

PROGRESS IN COAL INDUSTRY: STRIP MINING, NEW EQUIPMENT

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 30 Aug 80 p 3

[Article: "Coal Is the Bread of Industry"]

[Text] Our country is now extracting roughly 2 million tons of hard coal a day. How can we picture such an amount? If the daily output were loaded in railroad cars, the train would be 430 kilometers long. No other country in the world is extracting so much solid fuel. In the first four years of the 10th Five-Year Plan coal extraction in our country increased by 18 million tons, reaching 719 million tons last year.

The Soviet Union is the only large industrial country in the world which is basing its economic development on its own fuel-energy resources. In recent decades our fuel balance has shifted sharply toward petroleum and gas, but even today coal accounts for 27 percent in it. In the future petroleum and gas will be used more as industrial raw material. Therefore, the importance of coal in the fuel balance will grow. There is another fact that must be taken into account here: although we have considerable gas reserves, they are not unlimited, whereas our reserves of solid fuel will last many centuries.

Of course, it is more expensive to extract coal than petroleum and gas. To reduce the difference in the cost of the fuel, miners increasingly use the open-cut method. Compared to 1935 coal extraction in underground mines has increased just over four times, while extraction from open-cut mines has increased 258 times. Open-cut mines already produce more than 36 percent of the coal, and in the 10th Five-Year Plan they provided the entire increase in extraction.

The final, ninth phase of the Bogatyr' open-cut mine in Ekibastuz recently went into operation. The annual capacity of the enterprise has reached 50 million tons. One such enterprise produces 1.7 times more coal than the entire industry of prerevolutionary Russia. The

country gets its cheapest coal from this region. Its prime cost is just one ruble 37 kopecks a ton (it is several times higher in underground mines). The monthly labor productivity of an extraction worker here is about 1,000 tons compared to 49 tons in underground mines. In the near future the Ekibastuz basin will produce 170 million tons of fuel each year. For comparison we could point out that the total extraction in England is 121 million tons.

The South Yakutia complex began producing output in this five-year plan. Upon completion of construction there its capacity will reach 13 million tons. It is especially important that this is outstanding coking coal. Construction has been begun on the Kansk-Achinsk fuel-energy complex with a projected capacity of 150-160 million tons. According to forecasts by economists, in the near future half of our coal will be extracted by the open-cut method.

What about the other half? Gratifying changes are taking place there also. Last year alone several large underground mines went into operation: Tentekskaya in Karaganda and the Zapadno-Donbasskaya, Novo-Mirgorodskaya, and imeni Geroyev Kosmosa in the Donets basin. In just four years the sector received fixed capital with a value of almost 9 billion rubles, surpassing the corresponding period of the Ninth Five-Year Plan by more than 600 million rubles.

The new capital includes the latest equipment. Our country is the world leader for coal extraction by mechanized complexes. Last year 268 million tons of coal, roughly 60 percent of the entire output of underground mines, was extracted by such equipment. All the working faces at the Novomoskovskugol' [Novomoskovskiy Coal], Aleksandriyaugol' [Aleksandriya Coal], and Vostsibugol' [Eastern Siberia Coal] associations are equipped with hydraulic supports. In addition to other advantages, this equipment makes the difficult labor of miners completely safe.

The country will celebrate the mine worker's holiday on the last day of August. Mine Worker Day this year coincides with another anniversary: 45 years ago, on 31 August 1935, Aleksey Stakhanov set his famous record by extracting 102 tons of coal in a shift, 14 times the norm. Beginning in the coal sector, the Stakhanov movement made up an entire epoch in socialist competition. The mine workers themselves preserve and multiply the traditions of the first Stakhanovites. More than 450 brigades equipped with mechanized complexes are extracting 1,000 tons of fuel or more per working face each day. The entire country knows the names of Heroes of Socialist Labor M. Chikh, V. Murzenko, G. Smirnov, and V. Devyatko; the collectives they head consistently extract more than 1 million tons of coal a year.

More than 100 coal industry enterprises, 400 sections, and more than 1,300 brigades have already fulfilled their five-year assignments. The party, state, and all our people respect and value the labor of the mine workers. About 500 miners have been awarded the title Hero of Socialist Labor and more than 400 have won Lenin and State prizes and prizes of the Leninist Komsomol. But we can show the greatest respect for the mine workers if every day, everywhere we use the coal wisely; as V.I. Lenin said, "Coal is the bread of industry."

11,176
CSO: 1822

CONSTRUCTION OF SOUTH YAKUTIA COAL COMPLEX PROGRESSES

Moscow EKONOMICHESKAYA GAZETA in Russian No 34, Aug 80 p 1

[Article: "The First in the BAM Zone"]

[Text] During the 10th Five-Year Plan construction developed on the Southern Yakutia coal complex, the first in the BAM [Baikal-Amur Mainline] zone. As outlined in the resolutions of the 25th party congress, the Neryungri open-cut coal mine, a concentrating factory, a power plant, and several other facilities are now under construction.

The projected reserves of high-grade coking coal in this region reach 40 billion tons.

Large-scale construction work is going forward under harsh northern conditions, in a region of permafrost and high seismicity. Construction work was begun far from the railroad, which added more difficulties related to delivery of building materials and equipment.

Last year construction of the 220-kilometer BAM sector from Tynda to Berkakit was completed. The first trunk railroad in Yakutia is in operation. Side tracks to Neryungri have been laid. Building materials and equipment are arriving at Pogruzochnaya station, and through trains carrying coal are dispatched on the return trip.

About 700 million rubles has been invested in development of the complex during the five-year plan. The pace of work is expected to increase. An open-cut mine with a capacity of 13 million tons of coal a year is being built. The volume of excavation work is very large. More than 230 million cubic meters of overburden must be moved to completely develop coal extraction. At the present time 16 million cubic meters has been hauled away. A layer of energy coal has been uncovered, and is now being delivered to power plants and industrial enterprises of the Far East.

Meanwhile the collective of the section where V. Unru is chief is blasting the rock to prepare the work area for the powerful excavators and 180-ton dump trucks employed in hauling away the overburden. The leading brigade among excavators in the competition in honor of the 26th CPSU Congress is the brigade headed by V. Litvinov. Dump truck drivers Ye. Kornev, S. Slyusarev, P. Polovinkin, S. Subbotin, and others are widely known for their great skill.

The concentrating factory, which is projected to process 9 million tons of coal a year, will be one of the largest structures. It is being provided with the very latest equipment. The concentrating will be done in powerful hydrocyclones and flotation machines. The factory will produce high-quality coking concentrate. The outlines of the factory are becoming a part of the industrial landscape of Neryungri. The brigade of concrete workers headed by A. Mikeyev is working outstandingly at this site. The know-how acquired by the brigade leader in building the Vilyuy hydroelectric power plant and the Kama Truck Plant is being used broadly at the Yakut project.

Neryungri receives energy from the Zeya hydroelectric power plant. A thermal state regional power plant is being built there. It will have energy units with a total capacity of 570,000 kilowatts and water heating boilers with a capacity of 800 gigacalories. Work is being done by the Neryungrigresstroy [Neryungri State Regional Power Plant Construction] Administration, which is subordinate to Bratskgresstroy [Bratsk State Regional Power Plant Construction]. A total of about 20,000 people are working in the Neryungri region. Many of them came on Komsomol passes.

A new mining city is growing up. It already has more than 200,000 square meters of housing. Large-panel buildings have risen alongside the blocks of two-story wooden buildings. The first phase of a large-panel building construction plant is in operation.

A great deal has been done at the Neryungri construction site, but the main work still lies ahead. The people who are building the South Yakutia complex are now concentrating their efforts on introducing the first phase of the open-cut mine with a capacity of 2.5 million tons of coal and the energy coal loading complex and turning over the second phase of the building construction plant for use this year.

11,176
CSO:1822

UDC 622.279.5

SOME PROBLEMS IN THE EFFECTIVE USE OF PETROLEUM GAS IN WESTERN SIBERIA

Moscow NEFTYANOYE KHOZYAYSTVO in Russian No 5, May 80 pp 52-54

[Article by S. A. Al'tshuler, Affiliate of the Giprotyumenneftegaz Trust]

[Text] The complete and effective use of petroleum gas remains one of the unsolved problems in the West Siberian petroleum and gas producing complex.

The system for the use of petroleum gas, in addition to gas refining plants includes facilities and structures for its industrial preparation and its transport to the plant, as well as the transport of the liquid and gas production of gas refining plants to users. In Western Siberia, with its great distances, the investments in facilities for the collection of gas and the transport of production frequently exceed the investments on gas refining plants.

With respect to the technology of production the gas refining plants in Western Siberia are at a sufficiently high level. Accordingly, the principal means for increasing the effectiveness of use of petroleum gas must be sought in an analysis of the overall structure of the petroleum and gas producing region.

The complexities in solution of the problems involved in the use of gas have been overcome by the traditional structure of the refining system, including gas lines of a relatively short extent with numerous condensate lead-offs for the transport of gas to gas refining plants, the gas refining plant proper, ensuring the refining of gas in deposits situated in a radius of 30-50 km, and pipelines for the transport of gas from which the light benzine fraction is separated and liquid products of gas refining are sent to users. With such a structure of the system a number of serious problems arise that do not have a satisfactory solution.

Due to the fact that the location and capacity of gas refining plants are related to the prospects for the development of a relatively small group of deposits, a solution concerning their planning and construction is adopted after obtaining reliable information concerning the volumes of petroleum gas. This predetermines the lag in the construction of a gas

refining plant (taking into account the considerable time required for its construction) by 6-10 years or more in comparison with the beginning of petroleum production in the corresponding deposits. And since the systems for supplying different gas refining plants are not interlinked, a noncorrespondence appears between the raw material base and plant capacity.

The transport of petroleum gas with the drawing-off of fluid along the route of the gas pipeline without using compressors, which is widely employed, leads to considerable losses of its valuable components. The transport of fluid production of petroleum gas refining (not more than 2% petroleum by volume) is not connected with the transport of petroleum in the region and therefore it causes considerable expenditures.

In addition, the traditional system for the purification of gas, being one of the final links in the general system in the petroleum-producing region without clearly expressed "feedbacks," is weakly linked to petroleum production. This is ineffective both for the delivery of petroleum, since there is no possibility for the use of gas refining processes and products for the technological needs of the industry, and also for gas refining, since considerable additional expenditures are involved. This lessens the interest of nearby enterprises in the use of gas.

A group of specialists at the Giprotyumenneftegaz and the All-Union Scientific Research and Production Institute of Gas Refining in 1974-1978 proposed and validated a new system for the use of gas based on the following principles.

1. The construction of large gas refining plants in places most suitable for the transport of raw material and production and also from the point of view of the infrastructure of the region [1].

2. Ahead-of-time construction of facilities for the refining of gas, requiring greater times for construction than the times required for the production of petroleum.

3. Combination of the traditional method for the transport of petroleum gas without compressors and the transport of compressed gas without the drawing-off of condensate along the route of the gas pipeline, ensuring the reliable collection of gas in a radius up to 200-250 km [2].

4. The construction in a deposit or a group of deposits of an integrated gas complex, including a system for the collection of gas, in case of necessity a compressor station for its transport, gaslift production of petroleum and pumping of high-pressure gas into the stratum.

5. Separate collection of the production of boreholes having high and low buffer pressure [3], in case of necessity feeding gas for a great distance before a compressor station is put into operation.

6. The broad use of liquid products of gas refining for the production and transport of petroleum, in particular, for pumping into the stratum for the purpose of increasing petroleum yield, for reducing the viscosity of heavy petroleums, and also the joint transport of petroleum and stabilized condensate in proportions ensuring correspondence of the petroleum to the standards.

A series of scientific and technical problems must be solved for the practical realization of the proposed scheme.

The ahead-of-time construction of gas refining facilities is possible only when there are reliable methods for predicting the volume and quality of petroleum gas for 5-10 years. Since it is preceded by the exploration of petroleum and gas deposits and their development and outfitting, the predicted characteristics of these stages have an essentially probabilistic character and the prediction of the volume of petroleum gas inevitably is probabilistic [5].

The principal factors introducing elements of uncertainty into the prediction are the petroleum reserves in the deposit; the composition of the stratum petroleum, including for individual strata, determining the gas factor and the composition of the petroleum gas; the time of beginning of exploitation and the rates of exploitation of the deposit, determined, in particular, by factors external to the task (state of the infrastructure, rates of drilling and construction, need for petroleum); technology for working and plan for development of the deposits, in particular, potential removal, rate of removal, method for extraction.

The confidence interval for the prediction of gas resources for an individual deposit, determined with a joint examination of the influence of the enumerated factors, is 0.30-1.70 of the mathematical expectation, that is, the mean value. The confidence interval for a group of deposits, in conformity to the laws of mathematical statistics, is substantially narrowed for groups of deposits in connection with the reciprocal compensation of possible deviations.

The probabilistic nature of the prediction must be taken into account, in particular, in the choice of technical solutions ensuring the best results under uncertainty conditions: the capacities of the facilities in the system for the use of gas and the stage-by-stage character of their construction, foreseeing the relationship between the cost of construction of a system of different productivity and the potential value of the possible gas losses. In addition, the construction of large gas refining plants with a well-developed system for the transport of gas substantially reduces the possible prediction error because the gas from a greater number of deposits can be drawn into the purification system.

Methods are necessary for reducing the dispersion of prediction by an analysis of its individual components. For example, an analysis of the factors responsible for the time gap between the discovery of deposits and putting

them into operation made it possible to ascertain the influence of the magnitude of the reserves, borehole yield and location of the deposits on this gap.

The probabilistic nature of the magnitude of gas resources must be taken into account in determining the capacity of the facilities. For example, if for some considered region the anticipated petroleum gas resources are 6 billion m^3/year and their confidence interval is 6±2 billion m^3/year, the adoption of a decision as to the capacity of a gas refining plant in the range 4-8 billion m^3/year is dependent on the relationship of the cost of construction and the lost gas, taking into account the restrictions on the material and work resources.

In particular, it is possible to recommend the construction of the first stage of facilities with a capacity determined by the lower limit of the confidence interval, then providing for the possibility of expansion of the facilities with an increase in the production of gas and more precise determination of other factors.

It is equally important to develop effective methods for the transport of petroleum gas for different distances, some of the specific problems being the relatively small volumes to be transported from individual deposits; low separation pressures; considerable gas content of heavy hydrocarbons, condensing during its transport, and water vapor. For these reasons there must be a special technology for the preparation and transport of gas, particularly over great distances.

The Giprotyumenneftegaz Administration has proposed a method for the transport of petroleum gas without the drawing-off of condensate along the route of the gas pipeline and has determined the optimum variants of transport over different distances (up to 270 km).

Jointly with the All-Union Scientific Research Institute of the Gas Industry, a method has been developed and checked on an industrial scale for hydraulic computations of gas pipelines transporting condensing petroleum gas and a unified mathematical model of such a gas pipeline is being created, including equations describing hydrodynamic and thermal processes and phase transitions suitable for optimizing computations.

Work has begun on the construction of a powerful compressor station and gas pipelines for the delivery of the petroleum gas of the Var'yeganskaya group of deposits to the Belozernyy gas refining plant; plans are being laid for industrial compressor stations at the Kholmogorskaya Central Production Complex and at the Povkhovskiy distribution point for the delivery of gas to the Surgutskiy and Lokosovskiy gas refining plants.

It is desirable to create connecting links between the systems for supplying raw materials to the different gas refining plants. In particular, plans are being made for the segment of the gas pipeline from the Belozernyy Central Production Complex for delivery of the gas of the Var'yeganskaya

group of deposits to the Nizhnevartovskiy gas refining plant. The construction of such a gas pipeline was dictated by the planned change in the output of petroleum gas in different deposits and the need for compensating for random variations in output and refining of gas in individual facilities in the system.

The linkup of the field - gas refining plant system must begin with the choice of the parameters of the gas arriving for refining. The pressure of the gas arriving at the gas refining plant to a large extent determines the energy expenditures on refining and the economics of its refining in general. For example, in the refining of gas under a pressure of 40 kg/cm^2 an increase in the pressure of the gas arriving in the compressor sector of the gas refining plant from 2 to 4 kg/cm^2 results in a saving of 27% in the energy expenditures and up to 9 kg/cm^2 -- 50% [2].

The cost of the gas lines supplying gas to the gas refining plant is dependent on the pressure at the beginning of the gas line. For example, for the transport of petroleum gas of the Var'yeganskaya group of deposits to the Belozernyy gas refining plant an increase in the pressure at the beginning of the gas pipeline from 6 to 12 kg/cm^2 decreases the cost of construction of the gas pipelines by a factor of 1.8 with a decrease in the consumption of metal by a factor of 2. At the same time, an increase in the separation pressure of the petroleum and gas mixture can reduce the yield of the boreholes.

Accordingly, the optimum separation pressure for the gas and petroleum mixture can be selected only with an examination of the field - gas pipeline - gas refining plant system, taking the following factors into account: use of separate separation of petroleum and gas flows at high and low pressures [4] in the gusher production of petroleum; in order to avoid significant energy losses in the gaslift production process the pressure of the first separation stage for petroleum must exceed the pressure in the gaslift compressors unit by 0.5-2.0 kg/cm^2.

In the case of petroleum separation points at a distance of 50 km or more from the gas refining plant it is necessary to consider a variant for construction of the field compressor station. In the case of gas transport for a distance greater than 100 km compressor transport is more effective.

In the case of compressor transport of gas it is surmised that a considerable effect will be obtained with an increase in the initial pressure to a level ensuring its refining at the gas refining plant without additional compression. In a case when the gas refining plant is situated relatively close to the compressor stations in the system of main gas pipelines there should be compression to a pressure ensuring the delivery of gas to the location of these compressor stations. For example, an initial pressure for transport of the gas of the Muravlenkovskoye deposit of 75 kg/cm^2 ensures its refining at a gas refining plant located in the neighborhood of the Komsomol'skaya compressor station on the Urengoy-Chelyabinsk gas

pipeline and delivery to its intake. One must expect a decrease in energy expenditures in comparison with the traditional scheme for the placement of compressor facilities by approximately 50%.

Taking into account the desirability of creating a unified compressor complex for the petroleum field, there is a need for the production of centrifugal compressors, whose use would make it possible to solve, on a unified basis, the material structuring of different gas processes, including the transport and refining of petroleum gas, gaslift and the pumping of gas into a stratum.

The possible parameters of the compressors are as follows:

stage I: intake 4.5 kg/cm^2, output 35 kg/cm^2;
stage II: intake 33 kg/cm^2, output 120 kg/cm^2;
stage III: intake 110 kg/cm^2, output 360 kg/cm^2.

The power of the drives in the compressor stages must be selected in such a way that the total number of units at a compressor station does not exceed 8-12 and the fraction of the reserve units is close to the norm.

On the basis of the work which was done it can be concluded that there is a need for a more complete integration of gas refining processes into the overall structure of the petroleum and gas producing region.

BIBLIOGRAPHY

1. Al'tshuler, S. A., Gorechenkov, V. G., Kogan, A. G., et al., "On the Problem of the Effective Siting of Gas Refining Facilities in Western Siberia," RNTS, NEFTEPROMYSLOVOYE STROITEL'STVO (Petroleum Industry Construction), No 11, pp 31-32, 1977.

2. Al'tshuler, S. A., Koroleva, L. N., Ivanov, V. N., et al., "Analysis of Hydrodynamic Operating Regimes of the Gas Pipeline from the Samotlorskoye Deposit to the Nizhnevartovskiy Gas Refining Plant," RNTS, NEFTEPROMYSLOYE DELO (Petroleum Industry Affairs), VNIIOENG, No 2, pp 21-23, 1979.

3. Gorechenkov, V. G., Evgenson, S. A., Al'tshuler, S. A., Abrazheyeva, Z. P., "Distribution of Buffer Pressures in Petroleum Production in Deposits in the Nizhnevartovskiy Region," RNTS, NEFTEPROMYSLOVOYE DELO, No 8, pp 20-22, 1978.

4. Al'tshuler, S. A., Usol'tseva, T. Yu., "Prediction of Petroleum Gas Resources," NEFTYANOYE KHOZYAYSTVO (Petroleum Industry), No 6, pp 45-46, 1978.

[275-5303]

5303
CSO: 1822

USED AIRCRAFT ENGINES RUN GAS COMPRESSOR STATIONS

Moscow PRAVDA in Russian 22 Aug 80 p 2

[Article by V. Dinkov, first deputy minister of the gas industry, and A. Lyul'ka, chairman of the commission on gas turbines of the USSR Academy of Sciences, Hero of Socialist Labor, academician: "Ground Service of Aircraft Engines"]

[Text] Gas extraction in our country this year will reach 435 billion cubic meters, which corresponds to the decisions of the 25th CPSU Congress. We recall that in 1975 it was 289 billion cubic meters. Such an impressive growth in gas extraction in the 10th Five-Year Plan was possible only because of the construction of a large number of compressor stations and their equipping with advanced, basically new equipment.

Construction of a compressor station with stationary equipment of total power 40,000-50,000 kilowatts takes 16-19 months, and a station equipped with units with aircraft drive takes only 5-6 months. This advantage significantly reduced the periods for introducing the first phase of the Orenburg gas complex. This is why the experience of using aircraft engines that have finished their service life on airplanes to transport fuel on gas pipelines is of especial interest.

Gas turbine aircraft engines operate on kerosene. Under ground conditions the "heart" of the aircraft is switched from kerosene to natural gas. Such a design solution created an autonomous gas pumping unit in a block design. It does not need either a thick foundation or a building housing.

The small dimensions and weight of the blocks make them easy to move in the assembled form both on railroads and automobile roads, and by air to regions of difficult access where compressor stations are being built. Such mobility yields an additional effect: if it is necessary to deliver a new block it is taken from the exchange fund and the old one is sent for repair to the manufacturing plant. Here the compressor station operates without stopping for the reserve unit is hooked up.

The lack of water cooling, the possibility of self-heating, other design advantages proved the performance capacity of the units in the harshest winters when the outside air temperature dropped to minus 56°.

The advantages of the gas pumping units with aircraft drive permitted the builders of the underground mains to switch to the set-block design of all surface structures after fulfilling the set of planning and design work. This drastically accelerated construction.

The first industrial gas pumping units with aircraft drive began to be used back in 1974, and already in 1979 there were about 200 of them operating at 32 compressor stations. Over a hundred units are being assembled at other compressor stations.

The high quality and reliability obtained during the operation of the units on the main gas pipelines of the country defined the new directions of their utilization. The engines "labor" at compressor stations of depleted fields, assisting the stationary gas pumping units. They are used to inject gas into underground storage facilities during the renovation of compressor stations with stationary units, etc.

Last year the units with aircraft drive found yet another application, in the rapid construction of compressor stations under high mountain conditions. The gas industry was given the task of providing the Transcaucasus republics with natural gas from the fields of North Caucasus and Stavropol' in a short time. It was necessary to erect compressor stations in the mountains at altitudes of 800-1800 meters above sea level. The stations were erected and put into operation very rapidly, in only 5 months.

Now construction of the second branch of the Perm'-Kazan'-Gor'kiy gas pipeline and the Grayzovets-Leningrad pipeline is going at accelerated rates. Gas pumping units with aircraft drive are also being installed here.

In congratulating the collectives of the gas industry organizations, the builders and installers working to construct facilities for extraction, refining and transporting gas Comrade L. I. Brezhnev said: "One can note with satisfaction that a characteristic feature in the activity of the ministries, economic leaders, party, trade union and komsomol organizations, enterprises and construction sites has become the concentration of attention of the production collectives to a decisive section, the accelerated development and further perfection of the major gas complexes in the Tyumenskaya, Orenburgskaya oblasts, Turkmen SSR, Komi ASSR, and other regions of the country. Your initiative and creative work to implement this course permitted a rapid increase in the rates of extraction, refining and transporting of gas."

The total economic effect from introducing the gas pumping units with aircraft drive into the national economy in the 10th Five-Year Plan has already been 1.5 billion rubles.

One should note the important initiative of the USSR Gosplan for the introduction of aircraft units into the national economy. The USSR Gosplan has computed the engines that are in operation. As the flight service life is used up all of them will serve the national economy in a new capacity. In

addition, control over the annual increase in the service life of the aircraft drives has been organized.

We believe that the author's collective that fulfilled the work "Creation of Basically New Block-Container Gas Pumping Aggregates with Aircraft Drive and Their Introduction into the USSR Gas Industry" is quite worthy of being represented at the competition for the 1980 USSR State Prize.

9035
CSO: 1822

GAS STORED UNDERGROUND IN YEREVAN

Moscow PRAVDA in Russian 12 Sep 80 p 6

[Article by A. Arakelyan, colleague of the republic newspaper KOMMUNIST: "Gas for Reserve"]

[Text] A powerful compressor station has been put into operation near Yerevan to pump "blue fuel" into underground storehouses.

One can only judge the scales of this structure from a model. Here there is no actual construction area. No builders, mechanisms or equipment are visible. The entire "industrial landscape" is drilling units and pipes joining at the end of the picturesque field. If one looks more attentively then along the precisely designated pipelines one can define 19 vast sections scatterd over an area of 97 hectares. These are the zones of arrangement of the underground chambers. The "blue fuel" that has been preliminarily purified of admixtures enters here at a pressure of 125 atmospheres.

The gas storage plan was worked out by the specialists of VNIIpromgaz [All Union Scientific Research Institute of Gas Use in the National Economy and Underground Storage of Petroleum, Petroleum Products and Compressed Gases] and Armpromproyekt. The idea it is based on can be concisely stated as: with the help of powerful water jets the deposits of salt are washed away at kilometer depth, and the formed cavities are used for the gas storage.

An enormous quantity of high-quality sodium chloride has been extracted that was previously brought into the republic from the distant Lake Baskunchak. The economists computed that even now the resources obtained from the realization of the brine are two times greater than the cost of all the underground construction.

"We do not have to speak of the importance of the large gas reserves," says the general director of the production association Armyantransgaz R. Asatryan. "The fuel reserve in case of an accident on the main gas line will guarantee the continuous, rhythmic operation of the industrial enterprises, provide heat for the apartments of the people of Yerevan, and keep a blue flame in the kitchen hotplates. The demand for gas that at the same time is a valuable chemical raw material is rising at rapid rates. Therefore we are now completing construction of experimental-industrial tanks reservoirs for regasification of liquid butane where the entire technological process will occur in the depths of the earth without human participation."

9035
CSO: 1822

UDC 622.691.052.012(571.1)

NEW CONSTRUCTION METHODS FOR COMPRESSOR PLANTS WORK WELL

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 6, Jun 80 pp 18-19

[Article by V. F. Lysyuk and V. A. Ponyatovskiy, Kazymgazpromstroy Trust, Beloyarskiy: "Raising the Efficiency of Construction of Compressor Plants in Western Siberia"]

[Text] The Kazymgazpromstroy [Kazym Gas Industry Construction] Trust, which specializes in the construction of compressor plants, has developed and introduced a number of organizational and technical measures that have made it possible to reduce construction time and cost. For example, we have introduced the combined-flow method of constructing a start-up compressor plant complex. The start-up complex was divided into separate elements: "shleyfy" [translation unknown], the high side, the compressor shop, the low side, auxiliary facilities, and engineering grids. A special flow line was organized for each element.

The specialization of flow lines comprised: pile-driving work; preparation of foundations; installation of the above-ground parts of the building and erection of BKU's [modular block assemblies]; installation of industrial equipment; installation of sanitary engineering equipment, electrical equipment, and control and measuring instruments.

The primary industrial equipment, the turbines and superchargers, installed before construction on the compressor shop building began. The combined-flow method made it possible to concentrate material-technical and labor resources within a single element and thus reduce the time required to perform particular operations, providing a work area for the next construction-installation flow process. With the use of this method the construction time for a compressor plant was 10-11 months; according to the Ministry of Instruction of Petroleum and Gas Industry Enterprises the average time is 14-15 months. The economic benefit from reducing the time required to introduce compressor plants reached 2 million rubles.

When the collective of the trust was given the assignment of building the Purpe compressor plant on the second phase of the Urengoy—Chelyabinsk gas pipeline, which is far from main transportation lines, several more organizational proposals were made.

It was decided not to do cast in-situ reinforced concrete work in the initial period of construction. All cast in-situ reinforced concrete pileworks with a total volume of more than 1,000 cubic meters were replaced by metal works made of rolled steel elements using tubular steel piles. These foundations were used under the frames of the shop, the gas framing of the supercharger, the low side, dust traps, power plant, and so on.

The individual pileworks assemblies were manufactured at the trust's center in the settlement of Beloyarskiy and delivered to the construction site by helicopter. A procedure was developed for installing gas pumping aggregates without preliminary construction of cast-in-situ reinforced concrete slabs. Big gas pumping aggregates were mounted on planned supports set on piles driven earlier (see illustration [not reproduced]). The foundation slab was put in parallel with machine installation work. The result of this revision of the plan was to create a work area for installation of the above-ground elements of the compressor shop within 20 days after pile-driving work was begun. By this time all the turbines and pileworks for the frame of the shop had been installed. With casting in-situ this period is 2-3 months.

The Purpe compressor plant went into operation eight months after the first pile was driven, despite the complex conditions of an undeveloped site, the lack of construction base facilities, and failure of the client to deliver equipment on time.

There is a way to reduce further the ground-level work cycle for compressor plants by using steel piles with greater load-bearing capacity. This will make it possible to dispense with driving pile clusters made up of 4-6 piles, reduce the volume of pile-driving work to one-third or one-fourth of its present volume, and cut the volume of work to install pileworks accordingly. It is advisable to use tubular metal piles 500-700 millimeters in diameter. Metal pile-casings of the same diameter filled with earth are efficient.

Large-diameter piles not only reduce labor inputs and construction time, but also cut metal use in half compared with clusters of steel piles 325 millimeters in diameter.

The use of large-diameter piles requires heavy pile-driving equipment and devices for two-sided insulation of tubular pile-casings with durable insulation coatings based on epoxy resins.

The experience of the Kazymgazpromstroy Trust has demonstrated that the construction time for a compressor plant of 50,000-60,000 kilowatts

capacity can realistically be reduced to 6-7 months (this does not include the time required to set up outpost settlements for the construction workers).

For compressor plants with capacities of 80,000 kilowatts using GTK-10-4 aggregates the following steps will be efficient. Installation of the gas pumping aggregates at grade level instead of below-grade. This reduces the weight of the metal components of the compressor shop by roughly 300 tons. Where gas pumping aggregates in individual shelters are used instead of a common compressor center (GTK-10-4 gas pumping aggregates), the weight of the metal in the construction and technological components is reduced by another 700 tons and the volume of heat insulation is cut by more than 1,000 cubic meters. The use of superchargers with a high degree of compression that makes it possible to liquefy gas in one stage offers a possibility of reducing the need for metal by 250 tons. Increasing the unit capacity of the aggregates provides an additional reduction in metal use as well as a decrease in the volume of electrical installation work and work to install control and measuring instruments and automation equipment, and general construction work.

The greatest impact from introduction of these measures can be obtained with maximum use of modular elements and a high degree of factory readiness both for the gas pumping aggregates themselves and their vital support systems and for the equipment shelters.

Combining the above-ground part in a modular set form with a support cycle using piles (with metal pileworks without broad use of cast in-situ and prefabricated reinforced concrete) will make it possible to cut the labor-intensiveness of construction in half, raise labor productivity, and reduce the construction time of a compressor plant to six months. This is especially important under the conditions of Western Siberia with the shortage of labor, transportation problems, and a harsh climate.

11,176
CSO:1822

STRUCTURE, PROBLEMS AND PROGRESS OF TIMANO-PECHORA COMPLEX DESCRIBED

Moscow PRAVDA in Russian 1 Sep 80 p 2

[Article by A. Skrypnik, special correspondent of PRAVDA: "Timano Range"]

[Text] The general director of "Komineft'," Anatoliy Stepanovich Gumenyuk emerged from the car and said: "This is our field."

Instead of the traditional rockers and oil derricks I saw headworks that are usually set up in coal mines. But the most surprising was underground where we descended in a rattling cage. In the slanted drift we saw an impressive picture: the walls from both sides literally dripped oil. Another very experienced specialist who was accustomed to working with the core sample in his whole life would not have occasion to see oil this way, living, in its original form. Even further, in the gallery, the oil flowed along pipes projecting from the walls into special collectors.

"This is heavy oil," the chief engineer of the Yarega field Yevgeniy Ivanovich Gurov explained. "Its value is that scarce lubricants are obtained from it for working under northern conditions and oil-lacquer bitumens. It is extremely difficult to extract it from the ground with a well, therefore the field is worked by such an unusual method as mines. We inject hot steam into the bed instead of water. On other sections we achieve 40-50% extraction. This is a lot when you consider that we started from 4%."

Gurov, endlessly enamored with his Yarega, smiled at this and continued: "The specialists believe that we have several years of work here. And at a new circumpolar Usinsk field..."

Gumenyuk stopped Gurov: "You did not say everything about Yarega."

"What else? Underneath us," for persuasiveness Gurov stamped his foot, "there is titanium ore alternating with the oil deposit. The reserves have already been explored and corroborated."

"And under Timano there are bauxites that can be extracted by open pit method, " added Gumenyuk. "And there are still fuel shales. All of this by northern ideas is generally close to each other. And the main thing is that it is close to the center of the country."

Nevertheless these were only several "diamonds" topping the crown of our European north. The conversation took place not far from Ukhta, in the center of the Timano-Pechora production complex; the need for forming it was announced at the 25th CPSU Congress. Perhaps from that first conversation everything that was found out later about the Timano-Pechora territorial-production complex seemed to be no more than a miracle of nature. It seems that precisely in this place it tried to assemble together for man all that was the most valuable that the depths of the earth hold. The Komi autonomous republic has an enviable diversity of fuel and energy resources: oil, coal, gas and fuel shales. This allows a major fuel extracting based to be set up here.

The Timano-Pechora complex today is in an unstoppable advance. From the very beginning it was thought of as a fuel and energy complex. It is no accident that the oil extracting branch is its most characteristic feature. It has acquired all-union importance and has become one of the leading in the formation of the complex. The association"Komineft'" in absolute volume of extraction has advanced from the 16th to fifth place in the last 3 years alone.

This is dynamics of development, this is an uncontrollable advance in everything: in roads laid to the north after the boreholes, in new oil pipelines, in the first apartments of the young city standing in the most exposed place, on the Usa River, in the harmonious bridges crossing the great Kolva, and in the fates of the people.

It is simply impossible not to marvel at what has been done in a short time. Together with the head of "Usinksneft'" Vitaliy Akimovich Usik we drove from the airport along a good highway made right through a swamp. Before this Usik had worked at a generally quiet, established field. They offered him this position. "Did you know that it was hard here?" "I knew. That is why I came." "Any regrets?" He was honest: "Sometimes. When everything is unbearable." He suddenly somehow pulled himself up: in the distance before us stood a white city on the background of a blue and clear sky, Usinsk. Then later when we travelled with him to the boreholes and flew into the tundra I observed this instantaneous transformation of his. It seems that he was entirely distumbed when something did not go well, but suddenly was happy about something good.

"Did you see the city? It is true that not everything is going well with the living conditions," and hurrying on he indicates: "The railroad has reached us, and do you know what this means for us, across our swamps? Only 5 years ago you could only reach us by helicopter, and now we have a highway."

A lot has been done: a construction base has been set up, roads laid, hundreds of kilometers of oil and gas pipelines, water lines, winter stations, cluster pumping stations, and high voltage transmission lines. All of this was done in the swamps during the long snowy polar nights.

Unfortunately not all the local reserves have been used to the end. There are still not enough water lines and few block cluster stations. And today a stable injection of water into the bed is needed in order to maintain that high rate at which oil is being extracted at the Usinsk and Vozeyskiy fields.

The question arises as to the creation of a real powerful construction base. It dictates the current rates of development of the Timano-Pechora oil and gas province, although the search for unused reserves is not excluded. In the first place this concerns the trust "Severpromstroy" for the construction of water lines and cluster stations is its duty. The trust is still slow to develop the fields. Water has to be injected with temporary pumps. The equipment for a very necessary unit of gas preparation is idle. The transition to remote control and automation is still an unresolved question on the agenda.

There is an excellent road from Usinsk to the north into the tundra. From above, from a helicopter one gets a special feeling for the rhythm of today's pulse of the Timano-Pechora complex in it: cars are continually bustling and nearby are the oil pipeline and power transmission lines. This is a good road that links several promising fields: Usinsk, Vozeyskiy, Khar'yaginskiy. But there are not enoubh of these roads. In the period from 1976 to 1980 the USSR Ministry of Transportation Construction was to introduce 40-50 kilometers of hardtop automobile roads per year. Only 70 kilometers have been made so far. Two subdivisions of "Permdorstroy" are working here; its administration is located hundreds of kilometers away in Perm'. It appears that the time has come to set of a powerful construction base locally.

Does it have to be said how much reliable roads mean here, in the swampy north: this is the fate of oil. Sometimes it is impossible to reach the borehole. Now the roads are being built by the pouring off method. It matters little that the sand and gravel mixture is scarce, here there is another problem: they pour it and it sinks in the swamp. I often had to hear the opinion of the specialists: roads are needed with a concrete pavement, including within the fields; their construction should be planned beforehand. Of course this will be more expensive, the more so under northern conditions. But would it be cheaper to have the machines idle for many days without roads? In the north you do not speak of a shortage of equipment. There is a lot. Nevertheless the main ingredient is missing: transportation that is especially adapted for working under conditions of the polar tundra.

Many ministries and departments are participating in the creation of the Timano-Pechora complex, and a lot depends on how they will work after collecting all efforts into one fist. The oil workers of Komi still do not use their internal reserves to the end, and they lie in an improvement in the equipment and technology of drilling operations. The branch is working under complicated conditions. The Ministry of the Oil Industry should strengthen the output of the association.

Whereas in the last 4 years "Kominefť" increased oil extraction 2.5 times, the volume of work done by the Glavkomigazneftestroy [Main Komi Administration for Construction of Gas and Petroleum Extracting Industry Enterprises] practically remained on the former level in this time.

The established disproportion makes itself known in a number of other ministries that are represented to a certain measure at the Timano-Pechora complex. We have already spoken above about the railroad line that linked Usinsk with the outer world. It has not yet been put into operation. The USSR Ministry of Power and Electrification did not provide the Usinsk oil workers with the second power transmission line with substations, and this could not help but have a negative effect on the work of the extractors. The Pechora GRES is being built extremely slowly, and as a result casing-head gas is being lost at the Usinsk field. Interests in the matter require that the RSFSR Ministry of Geology significantly increase the amount of exploratory drilling on the complex territory.

Observing the diverse bubbling and difficult life of the Timano-Pechor province one is convinced for oneself that the complex is growing and developing, and advancing. The gas extractors worked excellently in the 10th Five-Year Plan. In the past period there was a 3.2 billion cubic meter extraction of gas above the plan and over 400,000 T of gas condensate. New branches were built of the gas pipelines in the "Siyaniye Severa" system In order to advance further at rapid rates the USSR Ministry of the Gas Industry needs to significantly accelerate the delivery of equipment to erect compressor stations and a new gas pipeline branch.

Yet another remarkable feature of the Timano-Pechora fuel and energy complex is the coal basin, the only one in the vast northwest economic region. The fuel coal that can be extracted here is an important source for power plants and boiler houses in the northwest, while the coking coal feeds such giants as the Cherepovets and Novolipetsk metallurgical plants.

However the technological coal of Pechora is still not being completely utilized in the production of metallurgical coke. This is linked to the delay in the construction in the basin of facilities for deep enrichment of coal.

Of the 140 million tons planned for extraction in the five-year plan in the Pechora basin half is suitable for coking. This will permit the Timano-Pechora fuel and production complex to make a considerable contribution to the solution of the country's fuel supply problem. It appears that the USSR Gosplan and the Ministry of the Coal Industry need to solve the question of bulding new mines in the basin, the more so since in recent years the industry of the central Urals has become interested in the Pechora coal. The enormous raw material reserves of the basin can become a reliable base for it.

In this respect the titanium and bauxite ores of central Timano whose reserves have already started industrial development acquire new value. The USSR Ministry of Nonferrous Metallurgy and the Ministry of the Chemical Industry will evidently start working the valuable field.

When you fly in a helicopter and from above look at the immense spaces you will see cities, gas pipelines and oil derricks, and precisely at that moment you cannot help but marvel at the grandeur of the human spirit and the work of human hands. The people of the north are a special breed. Often by habit we say: man goes north to earn money. This is not the case, but rather an age-old striving of people to do work that is worthy of a real person. The north makes one feel thoroughly at home. Many settle here for a long time. Young people mainly come. They need housing, schools and kindergartens. This need is permanent. Usinsk is being built up, and 200,000 square meters of apartments have been made. Nevertheless the construction has to be more intensive so that its rates do not lag behind the rate of increase in oil extraction.

In its present form the Timano-Pechora territorial-production complex looks like a lush tree, developing in width and already bearing a lot of fruit. But this tree must have strong roots to be a match for the Timano mountain range. We discussed this with the first secretary of the Komi CPSU obkom I. Morozov.

Let each of the more than 12 ministries represented here operate efficiently and in agreement, guided not by departmental, but national interests. Now on the border of the 10th and 11th Five-Year Plans a lot also depends on the planning agencies. The territorial-production complex in the northern European sector of the country has the right to count on universal attention and concern.

The future of the true pearl of our close north depends primarily on this now.

9035
CSO: 1822

SPACING OF WELLS INCREASES OIL OUTPUT

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 4 Sep 80 p 2

[Article by N. Lisovskiy, chief geologist of the association "Bashneft'": "Arlan Experiment"]

[Text] On the Bashkir fields that have been operating for about 50 years different methods are being tested to influence the increase in bed output. One of these methods consists of selecting the optimal well spacing. The achievements at the Arlan field that is located in northwest Bashkiria indicate how significantly it has advanced the output.

In the general plan for working the field versions were adopted with spacing of 24-48 hectares per well. But it soon became clear that the planned indicators could not be attained with such a system of working. The geologists of the association "Bashneft'" and the scientists of the institute BashNIPIneft'[Bashkir State Scientific Research and Planning Institute of the Petroleum Industry] viewed the sparse arrangement of the wells as one of the main reasons for the lag behind the assigned indicators. But there was also another opinion. Certain scientists insisted that the bed output and the degree of well flooding have little dependence on this indicator.

Taking into consideration the importance of the question it was decided to conduct the Arlan experiment at the Novo-Khazinskiy section in order to study the influence of well spacing density on the technical and economic indicators of working, and especially the bed output. The first results of the experiment are already encouraging: the oil output in the additionally drilled wells was fairly high, and it did not drop even in the wells of the main fund. The boundaries of the experiment were further expanded. A total additional 1,960 wells were drilled to improve the working of the field, with the consideration that their arrangement occupied the least amount of ground. In addition the flooding system had to be perfected a lot.

These major measures had an immediate effect. Over 47 million tons have already been extracted from the additional wells. At the same time the degree of flooding of the products in them, as studies have shown, is

lower than in the wells of the main fund. In a word new potentialities have been revealed for increasing the bed output. The expenditures for the drilling have also been justified: a considerable economic effect has been obtained.

The estimates of the specialists and scientists demonstrated that it is the most expedient to drill 1 well on 8-12 hectares. This will guarantee an increase to 12% of the final bed output. Of course when working the section one should bear in mind the complexity of the geological structure of the productive beds and the features of the oil filtering in them. Precisely these factors were considered in the Arlan experiment.

The current five-year plan required continuous and extensive searches for reserves by the geologists, other specialists, and innovators of production. This is especially necessary for us, the oil workers of Bashkiria since with declining extraction at the old fields it is much more difficult to maintain it on one level. However our association for over 10 years has been stably extracting 40 million tons of oil per year. Experience has demonstrated that in the later stage of operation when the less permeable intercalations yield the main influx the effect of the well spacing density on the output of the depths is even greater.

Under these extremely complicated conditions we have successfully found ever newer potentialities for extracting fuel from the beds. For example, at one time we worried about the Tuymazy field. In order to study the distribution of residual supplies of liquid fuel in the beds 24 development test wells were drilled at the most diverse points of the section. The results showed that the upper bed that is worse than the main in thickness and permeability is being poorly worked. A working plan was set up that provided for drilling of an additional 217 wells to extract the remaining reserves. Each of them will yield about 25,000 T of oil.

It is precisely the arrangement of the well spacing on the optimal plan that will increase the output of liquid fuel. The extraction of fuel at the same Tuymazy sections is now much higher than at other fields.

But it is not only the method of optimal spacing that increases the bed output. Searches are underway in other directions as well. One of them is the resurrection of the "dormant" wells whose potential as it turned out is far from exhausted. This is graphically indicated by the experience of the collective of the administration "Tuymazaneft'" where a large group of wells was stopped for different reasons. In several years it was decided to thoroughly check each of them. And it was found that with forced recovery the wells again produced liquid and yielded an additional quantity of oil. It is remarkable that their degree of flooding became lower for a certain time than before the conservation. The result of such well revival is fairly weighty: hundreds of thousands of tons of additional liquid fuel were extracted from the depths.

Today other methods of influencing the bed are also being used at the fields of Bashkiria. Electric centrifugal pumps are being widely introduced. The technology for injecting deposit water and chemical reagents into the depths to stimulate the drowsy deposits has been developed for oil displacement. The accumulated experience and the introduction of new methods for influencing the bed at the same time prolongs the life of the old fields. With an economical approach to the developments and working of the deposits they will still make a long and weighty contribution to the oil river of the country.

9035
CSO: 1822

NEW OFFSHORE DRILLING RIG FLOATS ABOVE DANGER

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 14 Aug 80 p 6

[Article by A. Alekseyev: "Borehole Starts to Float"]

[Text] A powerful tug travels over the sea, barely shaking on the steep wave. A cyclopean structure floats behind it, chained by thick steel cables. The enormous columns, each almost 10 meters in diameter and as tall as a 10-story building rest in 3 rows in the bottom of 2 giant barges like a six-legged elephant towering on a mythical tortoise, holding our earth, as they believed in ancient times. Only instead of the earth this is a spacious multilayer deck 79 meters long and 61 meters wide, almost an entire football field! This entire structure is crowned by an openwork drilling derrick rising a hundred meters in height.

What was this steel island needed for?

The oil and gas fields on the continent that could be developed comparatively easily are well known. They are being operated at full speed. The situation is more complicated with the searches to develop fields of fuels in the shelf (shoal) zone of the seas. For until now the traditional self-rising boreholes could stand on the ground only if the depth did not exceed 90 meters. And in this case the elements made themselves known.

However even strong hurricanes are the least concern of the offshore borehole designers. The winds generate sea currents and scatter enormous masses of water. It is true that their velocity is only 3% of the wind velocity, but the water density is 800 times greater than the air density. Therefore the strength of the wave blow to the steel frame of the borehole is 25 times greater.

At the same time a storm is an uncontrollable element: waves shake the structure with blows whose strength and frequency simply cannot be predicted; they literally rip it into pieces. The foam crests fly higher than 10 meters. And in such a "hell hole" the borehole must not only remain standing, but also work reliably without stopping for an hour.

If one takes into consideration that the exploration has to be done at depths of about 200 meters then the traditional designs are not suitable at all. For the "legs" of the borehole have to be made so massive that it is a super complicated problem to transport them and install them. The designers had to think up something fundamentally new. And they successfully coped with this problem.

"'Shel'f-1' is the name of the first domestic semi-immersible offshore borehole," the deputy head of the drilling department of the Ministry of the Gas Industry A. Noskov relates. "The designers took the idea from floats half submerged in water while the top projects above the surface. In the transport position the platform stands on two floating pontoons and is towed to the exploration region. "Shel'f-1" stops in the necessary place and ballast (sea water) is pumped into the floats until the supports are immersed to 17 meters. The platform is suspended 13 meters above the waves. Strong anchor braces reliably secure the steel island in place."

Now it is not afraid of any storm. At the depth where the pontoons are submerged the water is calm, and on the surface the waves cannot cause damage to the highly elevated platform. And if a threatening storm warning is received then part of the ballast is pumped out of the tank and the platform is raised 17 meters above the water for greater safety.

Accurate sensors are continually following the settling of the floating borehole. During the operation of "Shel'f" freight and fuel can be received and this means that its mass is changed. In addition the wind and waves can have a varying influence. The operator for balancing strictly controls the settling and heeling of the platform from the central panel, and if necessary levels it with the help of the ballast tanks.

The main task of "Shel'f-1" is to explore the underwater "storehouses"; therefore the powerful drilling unit created by the specialists of "Uralmash" is the main item on it. It drills wells up to 6,000 meters deep. An entire complex has been provided for preparing the drilling solution and cementing the wells. The researchers have a modern logging station. With its help the depths are probed by explosive waves, electrical impulses, gamma rays...

If at last a valuable bed is found then one can measure the output, pressure and temperature directly on board, in a word, all of its "questionnaire data." The chemists analyze the oil or gas in a special laboratory.

The floating island is a complex engineering structure: equipment to guarantee the normal work and daily life of the entire crew is arranged on its multilayer deck and in the bilges. Elevators in the two middle supports carry the service personnel to the pumping stations and fuel tanks. From here the fuel runs on pipes to the diesel generators supplying electricity to the entire complex. A spacious area has been built on the upper deck for landing "MI-8" helicopters. A whole arsenal of diving equipment has been provided for operation and repair. Three on-board cranes easily cope with all the loading and unloading operations.

The designers did not forget about the comfort of the 100-man crew. They have comfortable single and double cabins, dining room, club and an entire complex of general services. In a word, everything has been done to make them feel at home.

The reliability and strength of "Shel'f-1" are undoubted. But the elements are the elements. Therefore, according to the laws of the sea register the floating borehole has an entire complex of rescue equipment. There is both individual equipment and multiseater tanker boats that are not even afraid of floating oil.

Today "Shel'f-1" is still standing in the dock of the Astrakhan shipbuilding association. The final work is being completed. Soon the floating borehole will go out to sea and will begin to be operated by the explorers of underwater depths.

9035
CSO: 1822

FUELS

SURGUT-POLOTSK OIL PIPELINE NEARS COMPLETION

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 16 Sep 80 p 1

[Article by I. Shvarts: "Mainline Approaches Completion"]

> [Excerpts] Over 2000 kilometers of oil pipeline have been put into operation on the Surgut-Polotsk line. The construction of the transcontinental mainline approaches the end. Currently the main work on this start-up construction site of the 10th Five-Year Plan is being done in the European sector of the USSR on the territory of the Kalininskaya, Vladimirskaya, Yaroslavskaya and Ivanovskaya oblasts. The mechanized columns of the Ministry of Construction of Petroleum and Gas Industry Enterprises who recently completed the route segment from Surgut to Gor'kiy today are moving to the west, to Polotsk, the final point of the route that stretches 3,300 kilometers

The builders based on the line from Yaroslavl' to Polotsk are fulfilling an important task. Over 400 kilometers of the remaining 800 have already been welded into a continuous branch; a lot of merit here goes to the collective of section No 2 SMU-1 of the trust "Lengazspetsstroy" of Glavtruboprovodstroy [Main Administration of Construction of Petroleum Pipelines and Pipelines]. The complex brigades of this section that are working on the territory of the Kalininskaya oblast have mainly completed the welding and installation work on an 88-kilometer route.

The pipe-layer, having seized a 36-meter section approaches the installation site. No more than 15-20 minutes pass and this pipe segment is connected to the main oil pipeline. In this way, joint after joint this over 3,000-kilometer main is being assembled.

"After completing the main volume of welding operations we have started eliminating the technological gaps," the head of the section Yevdokimov relates. "Gaps were left at the hardest sections of the route, but in general our collective is working on the principle of "continuous assembly."

The route is hard. At each kilometer there are several angles of turns, then streams and swampy ravines. To work "continuously" means to display

the highest qualification and daily persistence. For example, 240 pipe lengths had to be delivered to the line on the poor spring roads; the builders prepared a warehouse of the lengths near the swamp. There was almost no possibility of detouring the swamp. Nevertheless the leading builders of the mainline V. Popov and V.Chazov fulfilled very labor-intensive work in a 10-day period: they were able to pull 8 kilometers of pipe through the swamp with the help of drag harrows, at the same time ensuring the continuous rhythm of work on the section.

The main complexity is the construction of the transition through the Moscow-Leningrad railroad. A deep two-kilometer swamp stretches out on the approaches to it. But the builders are full of decisiveness to take it by storm by making log roads from timber. The students of the construction teams "Plamya" of the Yaroslavl' medical institute and "Gelios" of the Rybinsk aviation technological institute gave great assistance. They did all the auxiliary work to lay the beams in the log road.

The heavy machines rock and the multiton bodies of the pipes are fed one after another. The steel thread of the mainline already shines in the sun up to the very horizon. Here in the region of Likhoslavl' where the city of builders spreads not far from the route, the red calico mottoes "26th Party Congress--Worthy Meeting" and "All on a Labor Watch in Honor of the 26th Congress" flutter in the wind. The machine operators only return to the housing trailers of the city in the late evening, and tomorrow is a normal working day again, saturated with great labor events.

9035
CSO: 1822

UDC 622.276.65

INTRASTRATUM OXIDATION PROCESSES: PROMISING FOR PRODUCTION INCREASE

Moscow NEFTYANOYE KHOZYAYSTVO in Russian No 7, Jul 80 pp 38-40

[Article by Yu. P. Zheltov, Moscow Institute of the Petroleum and the Gas Industry]

[Text] Intrastratum oxidation processes for the purpose of increasing the degree of petroleum extraction from the deep layers came into use in the USSR in the 1930's. A. B. Sheynman and K. K. Dubrovay made the first attempt at "igniting" a stratum. However, in the 1930's-1950's the practical introduction of such processes in the working of petroleum deposits as intrastratum combustion and the forcing of petroleum from strata by hot water and steam for all practical purposes did not come about due to their inadequate theoretical, technological and economic back-up. Calculations of the quantity of heat necessary for heating a petroleum stratum, taking into account the heat losses at the top and bottom of the stratum, indicated that almost the same quantity of petroleum was burned in boilers as would be produced from the stratum.

In the 1950's E. B. Chekalyuk, K. A. Oganov and A. N. Snarskiy proposed that a hot zone be created in a stratum near pressure holes and that this zone be moved into the depths of the stratum by pumping in water [1]. However, only as a result of major experimental and theoretical studies carried out at scientific research institutes and data obtained in applying thermal methods for the working of the Okha deposit on Sakhalin and the Yaregskoye deposit in the Komi ASSR was it possible to create and validate a technology for the extraction of petroleum by the "thermal fringes" method. In this method the stratum is not entirely heated, but after the creation of a hot zone (the fringes) in it the cold water is pumped in [2].

In the late 1950's and the early 1960's there was an increase in interest in the method of extraction of petroleum by intrastratum combustion. Scientific research and experimental industrial work was carried out in the USSR, Hungary, Romania, United States, Holland, France and other countries. This demonstrated the possibility of carrying out intrastratum combustion in real strata. On the basis of investigations carried out at the Institute of Geology and Exploratory Geophysics and the Krasnodar Scientific

Research and Production Petroleum Institute in 1967 in the Pavlova Gora deposit in Krasnodarskiy Kray it was possible to bring about intrastratum combustion by the pumping of compressed air into the stratum [3]. During the period 1967-1971, as a result of investigations made by the Ukrainian Scientific Research Institute of Petroleum Production (UkrNIIPND) in the Skhodnitsa deposit, intrastratum combustion was carried out with the use of a gas-air mixture [4].

The investigations of intrastratum combustion indicated that the velocity of movement of the zone of intensive oxidation reactions, in many cases being narrow and called the combustion front, differs from the rate of convective heat transfer. As a rule, in dry combustion, that is, with the pumping of air alone into the stratum, the rate of convective heat transfer is many times less than the rate of movement of the combustion front. Thus, the heat generated in the stratum remains behind the combustion front.

It was demonstrated in [5] that the rate of convective heat transfer can be substantially increased as a result of pumping water as well as air into the stratum. The ratio of the velocity of the combustion front v_{fr} to the rate of convective heat transfer in the stratum v_t is determined using the formula [5]

$$v_{fr}/v_t = C_{vhcs}/R_0 C_{vhcf}, \quad (1)$$

where C_{vhcs} is the volumetric heat capacity of the stratum in $J/m^3 \cdot K$; R_0 is the specific expenditure of air spent on the combustion of coke residue per 1 m^3 of the stratum, in m^3/m^3; C_{vhcf} is the effective volumetric heat capacity of the matter moving in the stratum (combustion gases, petroleum and water) in $J/m^3 \cdot C$, which can be computed using the formula [6]

$$C_{vhcf} = C^0_{vhcg} + \lambda C_{vhcw}, \quad (2)$$

where C^0_{vhcg} is the volumetric heat capacity of gases moving in the stratum under normal conditions in $J/m^3 \cdot C$; λ is the water-air ratio of water and gases moving in the stratum (for an approximate estimate it is possible to use the ratio of the volumetric flow of water pumped into the stratum to the volumetric flow of air); C_{vhcw} is the volumetric heat capacity of water (water vapor), in this case also being measured in $J/m^3 \cdot C$.
In dry combustion $\lambda = 0$. If $C_{vhcs} = 2.1 \cdot 10^6$ $J/kg \cdot C = 500$ $Cal/m^3 \cdot C$, $C_{vhcg} \approx 10^3$ $J/kg \cdot C = 0.24$ $Cal/m^3 \cdot C$, $R_0 = 300$ m^3/m^3, then $v_{fr}/v_t = 7$. Thus, the velocity of the combustion front is 7 times greater than the rate of convective heat transfer. The heat generated in the combustion process will remain behind the combustion front and the rate of expulsion of petroleum from the stratum is determined for the most part by the velocity of advance of this front.

However, already with $\lambda = 10^{-3}$, that is, the pumping into the stratum for each 1,000 m^3 of air of 1 m^3 of water with $C_{vhcw} = 4.19 \cdot 10^6$ $J/m^3 \cdot C$ and with the other data remaining constant $v_{fr}/v_t = 1.35$, but with $\lambda = 2 \cdot 10^{-3}$

the ratio of velocities is 0.67. In the latter case $v_t > v_{fr}$ and a high-temperature zone, ensuring better expulsion of petroleum from the stratum, will be formed in front of the combustion front and will move more rapidly.

The theoretical idea of the possibility of acceleration of heat transfer in the stratum and formation of a high-temperature zone in front of the combustion front -- a steam-water plateau -- was fully confirmed by experimental data [6].

As a result of investigations by the All-Union Scientific Research Institute and the Azerbaydzhan Scientific Research and Petroleum Production Institute, in collaboration with the Azneft' Combine, for the first time in the USSR plans were laid for such work and a moist combustion process was initiated in the Khorosany area of the Balakhany-Sabunchi-Ramaninskoye petroleum deposit in the Azerbaydzhan SSR [7], which has been worked since 1930. The stratum subjected to this effect consists of terrigenous rocks (clayey sandstones) and contains petroleum with a density of 0.93 g/cm^3 and a viscosity of 140 cP (centipoises). The mean depth of the layer is 300 m, the temperature is 23-25°C and the stratum pressure is about 1 MPa.

In a pressure hole the stratum was heated for 14 days by means of an electric heater designed at the All-Union Scientific Research Institute with the simultaneous pumping-in of air. Thereafter the oxygen content in the neighboring boreholes was reduced whereas the carbon dioxide content increased. Carbon monoxide appeared and there was an increase in pressure in the pressure hole, evidence of initiation of the intrastratum combustion process.

The dry combustion process continued for a year; then water began to be pumped into the hole, the volume being increased from 20 to 70 m^3/day. In the case of moist combustion the injection pressure was increased from 3.4 to 4.4 MPa. The yields of the surrounding boreholes increased by several times. Subsequently the intrastratum oxidation processes were also initiated in other boreholes in the deposit. During the first three years of use of moist intrastratum combustion twice as much petroleum was produced in the considered sector than during the entire time of its working.

The data from these investigations and the experimental-industrial work show that the high-temperature effect on the stratum, both with the pumping of steam into it, as well as with intrastratum combustion, with comparable material expenditures, makes possible a considerable increase in petroleum production in deposits with a high and increased petroleum viscosity (more than 20 cP) in comparison with other methods. In addition, thermal effect methods are not based on the use of artificial chemical reagents, but substances which occur most widely in nature and thus are most accessible -- water and air.

In examining the prospects for the development of methods for the extraction of petroleum with the use of intrastratum oxidation processes we will compare the effectiveness of these methods and the steam heat effect.

The pumping of steam into strata differs from intrastratum combustion in having a simpler technology. However, intrastratum combustion has the following advantages.

1. A more effective use of heat, related to an absence of heat losses in surface lines and in the rocks surrounding the borehole.

2. The combustion of fuel in the stratum not yet extracted, representing the heavy fractions of petroleum which are difficult to refine in the petrochemical industry. The lighter fractions, and also some of the heavy fractions, are extracted from the stratum by distillation and hydrodynamic expulsion.

3. There is a great possibility of moving the high-temperature zone for considerable distances, which makes it possible to work petroleum deposits with the application of this method when there are great distances between boreholes, equal to the distances adopted in working deposits with the use of ordinary flooding.

The first advantage acquires great importance when working deposits with high and increased viscosity of the petroleum lying at depths greater than 800-1,000 m, and also under conditions when the heat loss into the rocks surrounding the borehole can change their properties substantially and eventually destroy the borehole.

The second advantage is more of an economic character. Experience shows that the working of petroleum deposits with a steam heat effect on strata is effective if in the production of 1 ton of additional petroleum a quantity of already produced fuel equivalent to 300 kg of petroleum is burned in boilers at the surface. Without question, in individual cases this figure can be less.

In the working of petroleum deposits with the use, for example, of moist intrastratum combustion, only several tens of kilograms of fuel will be expended at the surface for the compression of air and for the pumping of water for obtaining 1 ton of additional petroleum. To be sure, if one takes into account the fuel burning both at the surface and in the stratum, the quantity of expended energy carrier can be identical in the case of intrastratum combustion and in the case of a steam heat effect. However, it must be taken into account that in the stratum there is combustion of fuel the expenditures on which are related only to its exploration.

The third advantage of intrastratum combustion over the steam heat effect is of great importance because it involves the fundamental possibility of moving the high-temperature zone through the stratum by accessible means for distances comparable with the distances between boreholes and rows of boreholes, applicable in the working of petroleum deposits with flooding, that is, of 500-600 m or more.

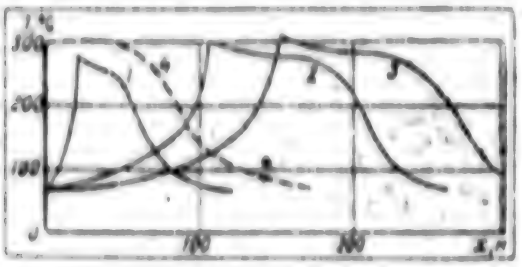

Fig. 1. Temperature distribution in stratum under thermal effect. 1, 2, 3) temperature changes 8, 32 and 45 years respectively after beginning of intrastratum combustion; 4) computed change in temperature 32 years after beginning of steam heat effect.

In the steam heat effect process the heat losses at the top and bottom of the stratum are considerably increased with the advance of the high-temperature zone into its depth due to an increase in the contact surface between this zone and the rocks surrounding the stratum. With the use of the thermal fringe method its temperature will decrease as the fringe advances into the depth of the stratum due to thermal conductivity and heat losses into the top and bottom.

An increase in the rate of pumping of the heat carrier into the stratum will make possible an increase in the possible depth of advance of the thermal fringe into it. However, its temperature will nevertheless be reduced.

In intrastratum combustion the heat losses, to be sure, are not eliminated. However, in the high-temperature zone (zone of intensive oxidation reaction) its quantity will be constantly replenished. Therefore, the heat loss from this zone can be completely compensated by the receipts of heat as a result of the combustion reaction. The temperature in such cases will not be reduced. Accordingly, in intrastratum combustion the high-temperature zone can move through the stratum as long as there is sufficient pressure from the pumps and compressors for compensating for the filtration resistances in the stratum.

The figure shows temperature profiles when a thermal effect is used, calculated for one of the deposits in the USSR using an electronic computer and employing the thermohydrodynamic model developed at the Moscow Institute of the Petroleum and the Gas Industry. The results of the computations agree quite well with the results of computations made using other known models. The initial data for computations of moist intrastratum combustion were: thickness of stratum -- 28 m, initial stratum temperature -- 67°C, stratum pressure -- 10.6 MPa, thermal diffusivity of the surrounding rocks -- $2 \cdot 10^{-3}$ m^2/hour, heat capacity of rocks -- $2.26 \cdot 10^6$ J/m^3·C, λ = 0.002, rate of air filtering -- 0.106 m/hour, which corresponds to the pumping-in of approximately $50 \cdot 10^3$ m^3/day of air in a linear zone of the stratum with a width of 700 m.

In computing the distribution of temperature in the process of steam heat effect the volume of steam pumped into the stratum is assumed to be equal to the total mass flow of air and water pumped into the stratum in the moist intrastratum combustion method. As can be seen from a comparison of the curves 2 and 4, corresponding to identical times for implementation of the modification process, the high-temperature zone in the case of intrastratum combustion advanced more than 200 m into the depths of the stratum, whereas when steam is pumped in -- only 80 m. It follows from curves 2 and 3 that the high-temperature zone, in the case of moist intrastratum combustion continues to advance and the temperature in it is not reduced.

Thus, under field conditions it was possible to study and confirm the principal parameters of the process of extraction of petroleum with the use of dry and moist intrastratum combustion, which makes it possible to carry out their field testing and in some cases put them into industrial use. A further study of these promising processes will make possible a substantial broadening of their field of applicability.

BIBLIOGRAPHY

1. Chekalyuk, E. B., Oganov, K. A., Snarskiy, A. N., "Method for the Thermal Working of a Petroleum Stratum," Author's Certificate No 330243, BYULL. IZOBRETENIY... (Bulletin of Inventions...), No 8, 1972.

2. Zheltov, Yu. P., Rakovskiy, A. L., et al., "Experience in the Planning of the Working of Petroleum Deposits by the Injection of Steam," TEPLOVYYE METODY DOBYCHI NEFTI (Thermal Methods for Petroleum Production), Moscow, Nauka, pp 54-61, 1975.

3. Amelin, I. D., Sergeyev, A. I., Geykhman, G. M., "Thermal Effect on a Stratum by a Moving Combustion Front (Experimental-Industrial Work in the Pavlova Gora Petroleum Deposit)," NEFTYANOYE KHOZYAYSTVO (Petroleum Industry), No 1, pp 41-46, 1969.

4. Kosarev, N. N., Sukhan, V. S., Myrka, Ya. M., Stempitskiy, T. V., "Method for Creating an Intrastratum Combustion Front Under Conditions of Petroleum With a Low Viscosity," TEPLOVYYE METODY DOBYCHI NEFTI, Moscow, Nauka, pp 33-37, 1975.

5. Zheltov, Yu. P., "Expulsion of Petroleum from Strata by a Moving Combustion Front," TEORIYA I PRAKTIKA DOBYCHI NEFTI. TR VNII (Theory and Practice of Petroleum Production, Transactions of the All-Union Scientific Research Institute), Moscow, Nedra, pp 212-220, 1968.

6. Bokserman, A. A., Zheltov, Yu. P., Zhdanov, S. A., et al., VNUTRIPLASTOVOYE GORENIYE S ZAVODNENIYEM PRI RAZRABOTKE NEFTYANYKH MESTOROZHDENIY (Intrastratum Combustion With Flooding in the Working of Petroleum Deposits), Moscow, Nedra, 1974.

7. Amirov, A. D., Ali-zade, A. A., Vezirov, R. R., et al., "Experience in Creating an Intrastratum Moving Focus of Combustion in the Khorasany Area of the Balakhany-Sabunchi-Ramaninskoye Deposit," TEPLOVYYE METODY DOBYCHI NEFTI (Thermal Methods for Petroleum Production), Moscow, Nauka, 1975.
[275-5303]

5303
CSO: 1822

PETROLEUM PRODUCTION IN GEORGIA

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 2 Aug 80 p 1

[Text] Georgia became a republic producing petroleum only a few years ago when the first hole gushered in the Samgorskaya steppe, not far from Tbilisi. Now there are dozens of them and the volume of petroleum production is increasing each year. And now the transportation problem has become especially acute. Indeed, the transport of petroleum by railroad involves considerable difficulties: the Transcaucasian Railroad is overloaded even without it. There was one solution, the construction of a petroleum pipeline. And in 1977 its construction was initiated.

During its not-so-long history this year it was prepared for a start-up for the sixth time. Among the five preceding attempts to put the pipeline into operation only one was successful. And that was an extremely relative success. At the very end of last year, not far from Khashuri railroad station, the builders from the Glavyuzhnotruboprovodstroy (Main Southern Pipeline Construction Enterprise) (head of the central board N. Zhukov) and the other agency involved, the Tbilisi Pipeline Administration (administration head T. Mirznashvili), modestly noted the start-up of the first segment. Why modestly is understandable. This very breakdown into sections was, to say the least, arbitrary. And from the operations point of view, it is simply ununderstandable. The first section is from Samgori, where the petroleum is produced, to the Suramskiy Pass; the second is from the pass to the Batumi Refinery. However, it is customary to use the section term to refer to a technologically completed part of a project or complex, ready for operation. The breakdown of one pipeline into two parts obviously does not correspond to this definition. The unofficial explanation of this strange measure is as follows: they say that it was broken down in such a way to raise the spirits of the construction men, to place before them a specific, foreseeable goal. With the fifth attempt the builders achieved this goal, but practical benefits, naturally, did not follow.

But the reports do not give reason for optimism. The first quarter of this year ended with a frightening gap between what was planned and that which was done. Suffice it to mention that the start-up program was only realized

16%. The second quarter did not bring conspicuous changes. The half-year program was scarcely half-fulfilled.

The specialists of the Tbilisi Regional Petroleum Pipeline Administration as early as spring calculated what volume of work had to be done per day in order for construction work to be stabilized and then compared the optimum and actual pace of the construction men. And here is what was found: in order to complete the laying of the pipeline in August (September was needed by the operators in order to test the line) it was necessary to approximately triple the rate of welding on the line, increase the rate of filling of trenches by three and a half times, and increase the rate of insulation work almost fivefold.

The matter of the need for really getting going has been raised more than once. The directors of the Glavyuzhtruboprovodstroy and its subdivisions at conferences and work meetings were not short on promises. But the situation changed little.

And today the teams of the four administrations of the Glavyuzhtruboprovodstroy engaged in construction of the second section of the petroleum pipeline are still far from what conditions require. There have not been enough men for laying the pipeline, for earthmoving work and for transportation. The work, to be sure, is proceeding. But it is proceeding more slowly than it should. There is also a lack of workers along the route.

What is the problem? Is it a failure to understand the importance of the formulated task? That is not the case. At the Glavyuzhtruboprovodstroy they understand clearly that the line must be put into operation in September. There is evidently some other problem. It is obviously a "non-matching" of the plans of the builders and the contracting office. Apparently the builders have a target of December, not September. For example, take the construction administration "Gruztruboprovodstroy," now based in Kutaisi. This group has been assigned the most difficult, most responsible and lengthiest sector. And here is what was communicated by the chief of this construction administration Sh. Kakiashvili and the chief engineer V. Vlasov:

"Our team has performed its six-month program successfully -- by 113%. About 2 1/2 million rubles have now been spent this year on the petroleum pipeline work from the five million allocated for this year."

Simple arithmetic shows that 2 1/2 million rubles spent in six months is obviously little when the last two months remain before start-up. But optimism prevails in the reports...

Today the directors of the construction administration report that in their sector not all the pipes have been welded into the line. But a petroleum pipeline is more than a pipe. There are petroleum-pumping and pressure-reducing stations, and the final point for the reception of petroleum in Batumi and a highly complex system of energy supply and

communication facilities and sanitary structures. There is much involved. And it can be complained that the builders are proceeding like a student who has postponed preparations for an examination to the night before.

However, by no means all the line workers are acting like a remiss student. On 15 July of this year SOTSIALISTICHESKAYA INDUSTRIYA told in an article entitled "Line in the Mountains" about the successes of the personnel of the fourth section of the "Gruztruboprovodstroy" administration, which is headed by V. Borbakadze. In honor of the 26th Party Congress this team obligated itself to finish their segment of the petroleum pipeline ahead of time. It appears that the other participants in the construction project do not have to go far for leading experience.

But in the other sections they are making haste slowly. And finishing the work ahead of time in one 64-km segment does not fully solve the problem. Accordingly, there is no way in which the directors of the Glavyuzhtruboprovodstroy can avoid their responsibility for the timely putting of the pipeline into operation.
[275-5303]

5303
CSO: 1822

S. F. BUGRIM, EXPERT IN USES OF CONCRETE IN FAR NORTH, DIES

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 6, 1 Jun 80 p 3

[Obituary: "Stepan Fedorovich Bugrim"]

[Text] Stepan Fedorovich Bugrim, Honored Inventor of the Komi ASSR, doctor of technical sciences, and deputy director in charge of science for the Northern Branch of VNIIST [All-Union Scientific Research Institute for construction of trunk pipelines], has died suddenly in his 63rd year.

The name of Stepan Fedorovich is linked to such developments as new methods of laying concrete in permafrost soils, streamlining the technology for production of insulation-design element "porizovannyy" [possibly porous] light concrete, technology for concrete work using fine sands, the use of gas for heat treatment of concrete without an intermediate heat carrier, and accelerated methods of assessing the cold-resistance of concrete. These developments have been introduced broadly at construction sites in the Komi ASSR, Tyumenskaya and Arkhangelskaya oblasts, the Far East, and other regions of the country.

Stepan Fedorovich Bugrim laid the foundations of the cryology of porous silicate materials, which is a new field of the study of materials.

S. F. Bugrim published more than 100 scientific works and received 23 author's certificates for inventions.

While combining extensive scientific work with training of highly skilled science cadres, Stepan Fedorovich also actively propagandized the advances of contemporary science and technology.

11,176
CSO: 1822

END

END OF FICHE DATE FILMED

11/10/80 DM